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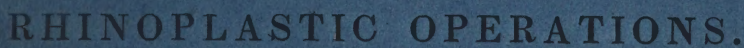
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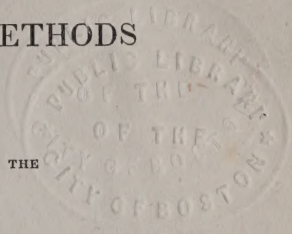
RHINOPLASTIC OPERATIONS.

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WITH SOME REMARKS ON THE

AUTOPLASTIC METHODS

USUALLY ADOPTED FOR THE



RESTORATION OF PARTS LOST BY ACCIDENT OR
DISEASE.

BY J. MASON WARREN, M.D.

Republished from the "Boston Medical and Surgical Journal."

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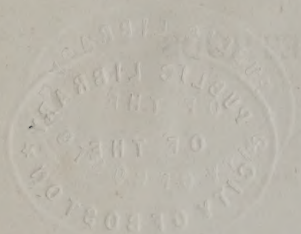
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1840.

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ELIOPOLASTIC OPERATION



SECTION OF THE UNIVERSITY OF TORONTO

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BY A. MASON WATSON, M.D.



Fig 1



Fig 2



Fig 3

Moore's Lith. Boston.

RHINOPLASTIC OPERATIONS.

CASE I.

THE history of the patient who was the subject of this operation, we shall give very briefly, as follows.

J. T. 28 years of age. Three years ago last spring, while scuffling with one of his companions, he received a violent blow on the nose, which dislocated the cartilage, driving it at the same time over to the left side. Some inflammation came on in the nose at the time of the accident, which very shortly subsided; and as he was out of town, and at a distance from medical advice, nothing was done to replace the cartilage, which remained in the situation into which it had been driven by the blow.

In the following spring, while pursuing his ordinary occupations, a small red spot appeared on the right cheek just below the eye; this very soon increased in size, the inflammation gradually spread, first attacking the lip, and from thence extending to the nose, which became red, swollen, and finally ulcerated.

It will be unnecessary to go further into the details of the case; suffice it to say, that in the course of eighteen months the whole nose, cartilages, septum, bones, &c. were successively attacked, and finally completely destroyed; the ulceration had also extended to the cheek of the opposite side. Subsequently to this, cicatrization gradually took place, leaving the patient in the state in which I saw him, six months after his recovery from the disease.

At this period, having accidentally come across a description of the Taliacotian operation, in an old magazine, he applied to know whether anything of a similar kind could be done to remedy his frightful deformity. The following was his state as he appeared on the first examination.

The nose, as described above, was completely destroyed, leaving in the place it originally occupied an opening about an inch in dia-

meter, bordered by a firm cicatrice ; the septum of the nostrils was destroyed, and the two nasal cavities thrown into one ; externally a small cicatrix descended from the lower and left edge of this opening to the angle of the mouth. In the course of the disease the four front teeth had been lost, and this, together with the absorption of the alveolar processes, had caused the upper lip to sink nearly an inch below the level of the lower one. An opening also existed between the lip and upper jaw, through which a probe might be passed from the mouth into the nasal cavities. The sense of smell was quite lost, and he was subject to a frequent flowing of tears over the face, arising undoubtedly from the too sudden contact of the air with the lachrymal ducts.

A thorough examination of his case having been made, and finding there was no positive obstacle against the possibility of the success of an operation, the difficulties of such an operation as would be required were distinctly stated to him, the improbability of its succeeding so as to restore the organ in such a manner that the deformity should not be known, that the new nose might become very much flattened, and perhaps on the appearance of cold weather gangrene might take place, and finally, that even his life might be endangered by it. I felt it my duty to state the case plainly, having seen all these accidents occur abroad from the operation, and death in two cases being the consequence, from severe erysipelatous inflammation of the scalp.

Notwithstanding all these objections, he said he was ready to incur any risk which would give him the least chance of having the deformity under which he labored obviated, as life in his present state was hardly desirable.

His case was certainly a hard one. A young man, in the prime of life, in other respects of a good appearance, was, by this frightful calamity, not only entirely cut off from society, but prevented from gaining the means of subsistence.

Having determined to submit himself to an operation, it was thought expedient to delay it a few weeks, in order to watch the case a little, and prepare him for it by a course of diet and regimen.

At the end of six weeks, his health being perfectly good, and he still persisting in the determination of having an operation performed, preparations were made to do it as soon as possible, as on account of the approach of cold weather, no time was to be spared. At this period he was seen by my friend Dr. Peace, of Philadelphia, who was

present with me at one or two operations of the kind practised by Dieffenbach in Paris, and he declared it, as his opinion, that the appearance of the patient offered every chance for success. The favorable circumstances were—the healthy state of the integuments surrounding the opening of the nasal fossa, the great height of the forehead, the whiteness and delicacy of the skin, and, added to this, the good state of his general health. All the preparations having been made, the operation was performed on the seventh of September.

A piece of pasteboard, cut in the shape of the letter V, that is, of a triangular form, and with a projection from its base, corresponding to the columna of the nose, was placed upon the forehead, and a trace made around it with the nitrate of silver; this being used in preference to ink, as recommended by Lisfranc, in order that it might not be liable to become effaced by the blood. A trace was also made around the opening of the nasal fossa, at the points where it would be necessary to remove the integuments for planting the new skin taken from the forehead. This was done on the night previous, in order to prevent any undue delay on the day of the operation.

All unnecessary articles of clothing being removed, the patient was placed on a table in a recumbent position, his face towards the window, and the operator behind so as to have the full command of the head. The traces made by the nitrate of silver were about two thirds of an inch apart between the eyebrows, each side of the triangular portion of skin was three inches and a quarter in length, with a base of three and a half inches, and the projection for the columna of the nose, which was to be taken entirely from the scalp, previously shaved, was an inch and a half long and two thirds of an inch wide.

The head being firmly supported by two assistants, the incision was commenced between the eyebrows, and the flap of the skin dissected up so as entirely to isolate it from the skin of the forehead, except where, for the purpose of nutrition, it was left adherent at the root of the nose. The incision on the left side between the eyebrows was extended a little farther down than on the right, the better to facilitate the twisting of the flap. This included the skin, subcutaneous cellular tissue, and a portion of the occipito-frontalis muscle, care being taken not to raise the periosteum, from fear of necrosis.

The flap thus dissected and twisted round to the left side, was carefully wrapped in a compress of linen cloth, and before the opera-

tion was proceeded farther in, attention was given to diminishing the large wound made in the scalp. Little hemorrhage had taken place, and the temporal arteries which had been cut, very soon retracted and ceased bleeding. The angles of the wound were first brought together by the twisted suture, two pins being employed on either side. Its edges between the eyebrows were also approximated in a similar manner; by this means the wound in the forehead was diminished at once to less than half its original size; it was still farther reduced by the use of a few strips of adhesive plaister, and a little scraped lint filled up the remainder of the wound. Some lint spread with cerate was spread over the whole surface, a pledget, and the whole secured by a bandage round the head.

The next object was to fix the borrowed skin in its place. In order to do this, it was necessary to freshen the borders around the opening of the nasal fossa, the traces of which, as stated above, had been previously made with nitrate of silver. For this purpose a short narrow knife, somewhat similar to a cataract knife, was used, and a strip of integument a third of an inch in breadth, removed, including all that portion which had been at all indurated during the cicatrization of the ulcerations. The knife was also passed between the lip and upper jaw, in which existed, as before stated, an opening large enough to pass a probe, and the adhesions between the two, for the space of an inch, entirely cut away. This was done for the double purpose of giving the columna of the nose a more deep and firm adhesion, and, in the inflammation which would subsequently ensue, to close up the unnatural communication between the mouth and nasal cavity.

The flap was now brought down into its place, its angles a little rounded with the scissors, the better to simulate the alæ of the nose, and the whole secured in its place by pins and points of the interrupted suture. From that portion of the skin which was to form the columna of the nose, the epidermic side was pared a little, so that it might form an adhesion not only underneath to the jaw, but on its sides to the quadrangular wound made for it in the upper lip.

A little scraped lint was now placed under the ends of the pins, and a strip of oiled lint introduced into each nostril to prevent adhesion; another strip was placed upon the nose to preserve its temperature. The dressings were secured by a band of adhesive plaister fixed to the forehead above, and partially divided in the middle, so that it might descend on each side of the nose to the lip.

During the whole of this long and painful operation the patient kept up his courage, and not a cry was uttered, nor the least struggle made that could at all impede the motions of the operator. Not much blood was lost, and his strength was so little exhausted that he was able to run up stairs to his chamber. He was ordered to go to bed immediately, to keep perfectly quiet, and a watcher left with him, who had directions, in case of his falling asleep, to prevent him from either rolling over on his side, or raising his hand to the nose so as to derange the dressings; also to wake him immediately should he breathe through the nose. To have arrow-root or gruel and lemonade, for nourishment.

On visiting him in the afternoon he was found comfortable; the new nose was warm, and had bled a little from the edges which formed the nostrils, both showing that the circulation was not at all impeded.

Sept. 10th. Passed a good night, slept well, pulse seventy-nine, complains of no pain, the nose of about the natural temperature. The gentleman who watched with him thinks that the lint on the right side of the nose was occasionally raised a little during expiration, when the patient slept soundly; he awoke him once or twice on this account. A purgative was ordered of the sol. sulph. magnes. and liquid farinaceous diet. A piece of cork was confined between the teeth, so as to keep the mouth open, it being hoped that this might prevent him from closing his lips during sleep and breathing through the nose.

11th. Quite as well, passed a quiet night, has a good appetite, pulse eighty. Watcher says that he occasionally made a motion to raise his hand to the nose, but, as if instinctively aware of the impropriety of it, withdrew it again without touching the dressings. The introduction of the cork had entirely effected its object, by keeping the mouth open, and preventing the passage of air through the nose.

12th. The first dressing took place four days after the operation, and the following was found to be the state of the parts.

The dressings on the forehead, after being well soaked were first removed. The angles of the wound were found to have united throughout, so that two of the pins were at once dispensed with. Union had also taken place in its lower part, just above and between the eye brows; the remainder of the wound, that is, its central part, in which union by the first intention could not take place, was suppurating well, and filled with healthy granulations.

The nose was next attended to. Upon the lint being removed, which had become very much hardened and caked in by the coagulated blood, it was found that entire union had taken place on both sides. The alæ of the nose and lower edges could not easily be seen without making use of too much violence in removing the dressings, which at present was not thought necessary. The columna was curved inwards, and the sutures concealed. The nose was of the natural color and temperature, and the circulation through it seemed uninterrupted.

Two strips of lint dipped in oil were laid over the cicatrix on each side of the nose, and no other dressings used. The patient was allowed to sit up a little, and to take any article of food of the liquid kind he might fancy.

On the 13th he was quite as well, with the exception of a little œdema of the upper eyelids, arising, undoubtedly, from the pressure of the bandages and other dressings on the forehead. One of the pins was removed from the forehead on the 13th, and another, the only remaining one, on the following day. The dossils of lint which had been placed in the nostrils still remained there, firmly caked in by the drying of the pus, blood, &c. These were not removed until the 16th, when their places were supplied by two pieces of hollow sound. Some difficulty was found in the introduction of the tube into the right nostril, which had become partially filled with granulations.

On the 14th a quantity of hair began to appear on that portion of the skin forming the columna of the nose, which, as will be remembered, was taken from the scalp; this hair, from time to time, re-required to be removed with the scissors. He was put upon a nourishing diet, with the caution to use the jaws as little as possible. He stated that occasionally, when he swallowed, he had a sensation as though he would "swallow his nose."

15th. The remaining pins were removed from the side of the nose, and the two sutures which confined the alæ; and on the 17th, ten days after the operation, the two ligatures, which confined the columna in its place, were also removed.

At this period, the following was the state of the parts. The wound in the forehead, from the adhesion by the first intention which had taken place, and subsequent contraction, had diminished to a third its original size, and the small triangular space which remained, together with that portion of the scalp from which the columna of

the nose had been taken, was filled with healthy granulations. From the wound to the root of the nose was a linear cicatrix nearly two inches in length, and continuous with the cicatrix on the left side. Adhesion of the integuments had taken place on both sides of the nose ; at the right alæ, however, the union was not quite so perfect as at the left ; that is to say, the whole thickness of the skin did not appear to have united. To assist the union, the skin of the face which lay under it was slightly scarified with the point of a lancet.

The columna of the nose was a little curved, and its edges had retracted inwards upon themselves. The inside of the nose was suppurating well, and at its upper part adhesion seemed to have taken place between the two bleeding surfaces which had been opposed to each other. The tip of the nose was well defined, and its edges were curved inwards so as well to simulate the natural appearance of the alæ, and just above the alæ, apparently from atmospheric pressure, a depression was taking place, forming their superior boundary. This was assisted by the patient making an occasional pressure with his fingers at these points. He feels well, has a good appetite, and sits up all day. He breathes freely through the tubes placed in the nostrils, which require to be daily removed in order to clear out the obstructions which collect in them.

At the end of a month the wound in the forehead had contracted to about a quarter of its original size ; adhesion of the nose was perfect in all points ; the openings of the nostrils were regularly rounded, and simulated well the natural appearance ; the tip of the nose is well preserved, and a regular curve takes place from its root to the end of the organ.

At the end of six weeks he was able to go out, but as the weather became cold he was advised to confine himself to the house, as cold evidently had a very great effect in retarding the cicatrization of the wound on the forehead. By reference to the second figure on the plate which accompanies this paper, a pretty correct idea will be formed of the state of things six weeks after the operation.

At the end of two months it was thought time to proceed to the second operation, which was required to remove the twist existing at the root of the nose. It will be easily conceived by referring to the plate, that underneath the pedicle which connected the nose with the forehead, a small portion of sound skin existed, and that of course no adhesion had taken place between this portion and the pedicle

lying over it. The method usually adopted by operators has been to cut the pedicle, after sufficient union of the nose has taken place below to justify the separation of it from its source of nutrition, and to fix it down at the root of the nose, in a transverse incision made for it at that point.

To this method there are some serious objections. First, the danger of inflammation in separating the pedicle ; second, of sloughing of the organ on the vessels being cut which have hitherto supplied it with blood ; and lastly, the very perceptible transverse cicatrix left after the operation. The method resorted to in the present case is liable to none of these objections, except, perhaps, the first one, in which the danger is much diminished.

This operation was as follows. An incision was made, commencing opposite the internal angle of the eye, and extending to that part of the base of the nose where adhesion had not been able to take place ; a corresponding incision was also practised on the pedicle. The skin being well dissected up, a small portion of integument was removed from the upper angle of the wound, where it had become wrinkled from the twist in the pedicle ; the edges were then brought together by three points of the interrupted suture. The same operation was to be performed at a future day on the other side, where, however, the opening was of about half the size, and not so perceptible. Union took place, throughout, by the first intention. Some trouble was experienced, however, by the formation of a small abscess in the new cicatrix, which suppurated and discharged itself.

The third drawing, executed four months after the operation, when the cicatrization had become complete at all points, gives a very good idea of his present appearance. He now declares himself entirely well, no secretion takes place from the nostrils, and on looking into those cavities a new skin is found to line them throughout. The nose itself has gradually diminished, so that by the first contraction of the integuments, and subsequently from suppuration, it has decreased to about two thirds the size of the flap which was taken from the forehead. Contraction also seems to be going on in its longitudinal axis, so that the distance between the tip of the nose and the mouth, daily increases. This will be much more perceptible, and the whole appearance of the nose much improved, when the four front teeth, which have been lost, are replaced ; this will bring out the under lip, and at the same time raise the tip of the

nose. The cicatrix in the forehead has become very small, and is gradually assuming the color of the surrounding integuments ; the scalp from which the columna was taken is lost in the hair ; the nose is quite firm, of a good form, and the cicatrix on each side hardly perceptible ; at the root of the nose on the left side, and at that portion which formed the pedicle, a small fissure still remains, which is for the present concealed by a strip of court plaister.

The health of the patient has never been better, his sense of smell is returning, and the tears no longer run over the face, and he, as well as his friends, congratulate themselves both on the moral and physical effects of the operation. He is now able to make his appearance during the daytime, which he has not done before during the last two years, and no person would observe anything remarkable in the nose, without a minute examination, when it would be difficult to explain the remarkable anatomical changes which have taken place.

Remarks.—In an operation like the present, of comparative rarity in this country, it will not perhaps be considered amiss, if a few remarks are offered on some of the most interesting points connected with its history, and of the chief difficulties which may occur to prevent its success.

The operation of Rhinoplastie is originally of very ancient date. For various reasons, however, it had fallen into most unmerited disrepute until of late years, when it has been again revived in Europe by the brilliant successes of Graffe, Dieffenbach, and Labat on the Continent, and Liston in Great Britain. Dieffenbach, in his late visit to Paris, where, with the accustomed liberality of the French, all the hospitals were thrown open to him for practising his celebrated operations for the restoration of lost parts, has, perhaps, done more than any other operator towards giving it its proper standing in surgery.

In the ancient operations of this kind, the lost organ was restored at the expense of the integuments in its immediate neighborhood ; advantage being taken of the extensibility of the skin of the cheeks, the integuments were dissected up on both sides of the nasal fossa, brought forward, and united in the centre by points of the interrupted suture. In case of the extensibility of the integuments not being sufficiently great, incisions were made on both sides in front of the ears, so as to diminish the tension of the skin at these parts, the wounds thus made being afterwards allowed to fill up by granulation. This operation, however, did not, as will be easily

perceived, restore the form of the lost organ, and the only advantage gained was a flap of skin to cover the existing deformity.

The operation which was afterwards adopted, and which now bears the name of the author, was that of Taliacotius, which consisted in taking the skin required, from the arm. The given shape of the nose being marked out on the place determined upon, the flap was dissected up, except at its base, and the integument thus taken was confined in a place prepared for it around the nasal fossa. In this operation, it was required that the arm, in case it was taken from that part, should be confined in contact with the face, for the space of ten or fifteen days, or until union had taken place; and it was not until then that the arm was released from its situation. The disadvantages of this method are at once manifest; the length of time required to keep the limb in this painful situation, so as in some cases to produce partial paralysis, and the danger that ensued in the too early separation of the transplanted skin from its source of nutrition, were, of themselves, reasons of sufficient weight to cause this method to fall into disuse.

The operation which has attained the most celebrity, is that which goes by the name of the Indian Method, in which the flap is taken from the forehead. This has been most frequently practised in France and England, and it is this method, which, it will be perceived, has been adopted, with some modifications, in the present case.

Having thus briefly referred to the history of the operation, some remarks will now be made on the chief difficulties which occur in the course of it, and the means taken to obviate them.

No operation, perhaps, requires more attention to the nice points of detail, than that now under consideration; and it is on these that the ultimate success of the operation, in a great measure, depends. For information on this subject, we cannot do better, than by referring to the work of M. Labat, one of the most valuable monographs for reference on *rhinoplastie* yet published. The author, in the description of one of his cases, after having referred to the trouble which he experienced from hemorrhage, while dissecting up the flap of skin from the forehead, goes on to state, "But an inconvenience much more embarrassing, and to which it was necessary to be resigned, from the impossibility of remedying it, was occasioned by the great quantity of blood, which, entering the throat, was violently expelled from the mouth every time that the pain of the operation

forced the patient to cry out. But what was much more troublesome still, was its being repeatedly received in the eyes of the operator, so as once or twice to oblige me to discontinue the operation for the space of some seconds."

The difficulty which the author here complains of, was remedied in the present instance by a very simple means. Instead of placing the patient in an upright position, he was made to lie upon his back on a table, the operator standing behind him; the blood was thus conducted off on each side of the face, instead of passing over the nasal fossa and mouth, and entering the throat. To guard against any possibility of this accident taking place, plugs were confined in the opening of the nasal cavities, during the dissection of the flap, and the time occupied in closing up the wound on the forehead. When the operation was commenced around this opening, and the entrance of the blood was unavoidable, the patient, who maintained sufficient coolness throughout, was requested to keep the blood as long as possible in the mouth, and an assistant directed to clear out, with a small sponge, what had collected, as occasion required.

We give the account of another trouble, in the author's own lively description, which, fortunately, was avoided in the present instance.

"But an accident of much more gravity, and which placed me in a very critical position, presented itself at a moment, when, after having detached from the forehead the flap of integument, I was about to bring it down into the place it was destined to occupy. Previous to making this twist of the new flap, it was thought necessary, as I have before stated, to prolong the incision on the left side as far as the medium line of the root of the nose, in order to facilitate the torsion of the pedicle; the patient experienced, at this moment, such a violent pain by the inevitable division which it was necessary to make of some of the ramifications of the frontal branch of the ophthalmic nerve of Willis, that he escaped from the hands of the assistants, rushed towards the door, and was determined not to undergo the remaining part of the operation. At this moment, his physiognomy presented a most frightful aspect; his forehead covered by a large wound, the borders of which, retracted by pain, had greatly augmented its extent, and all the rest of the face, his neck, and garments, inundated with blood. But a sight which was much more horrible to behold was the flap of palpitating integuments, which at every moment were jerked from one side of the face to the other."

In the present instance, no particular suffering was observed by

the extension of the incision down between the eyebrows ; and in case of any difficulty of this kind, the complete command in which the patient was held, from the position adopted, would have prevented any of the evils complained of by M. Labat.

One of the greatest difficulties of the operation, and that which, in its consummation, occupied the most time, was the introduction of the pins which were to close the wound in the forehead, and to continue the new nose in its situation. To remedy this as much as possible, the pins to be employed, which were the long pins, generally used by naturalists, were previously sharpened ; and for introducing them, a little instrument was constructed, somewhat similar to the aneurismal forceps of Dr. Physick, made with a small groove to receive the head and upper third of the shaft of the pin. With this instrument the pins were readily seized, and pushed through the skin, and the ligature being applied, their ends were cut off by the scissors or cutting pliers.

At that part of the flap which was to simulate the alæ of the nose, as it was necessary that the integuments should be directed inwards, the pins, of course, could not be used, and here a plan recommended by M. Labat was adopted, which was followed by partial success. A thread being passed first through the integument of the face, and then through the flap, at about two lines distant from their edges, the ligature was so tied as to produce, as it were, a fold at that point ; and the better to effect this object, a small piece of adhesive plaister, rolled up into the form of a cylinder, was confined under the threads, so as to make a strong impression on the wound and to force the edges into their places. This succeeded completely on one side ; on the other, however, the union, at first, was not so entire, the skin adhering only by about half its thickness.

During the whole of the treatment it was necessary to keep the openings of the nostrils distended by small tubes. The substance which seemed to answer the best for this purpose, was a portion of the barrel of a quill, the end which was to remain in the nose, being stopped up with a little melted sealing wax, and a small aperture cut in the side through which the air could freely pass. These were ingeniously constructed by the patient himself, who, after a time, was able to manage them without difficulty. The tendency to contraction at these points was very great, so that at one period, the tubes being left out during the night, it required considerable force to replace them.

From the new nose being formed entirely of skin, it will perhaps be supposed, that the integuments composing it are flaccid, and the form of it easily destroyed. This, however, from reasons easily appreciable, is not the case. The integuments of the scalp being naturally of great thickness, by the suppuration which took place from the inner side, assumed a firmness almost similar to fibro-cartilage; and at the root of the nose, the internal surfaces coming in contact, contracted adhesions so as to make the nose perfectly solid at that part. The size, also, of the columna, which doubled upon itself and contracting deep adhesions during the inflammatory process, formed a round and solid pillar to support the tip of the nose.

Great precautions had been taken to guard against exposure to the cold, which, by stopping the circulation, might at once defeat the whole object of the operation. As soon, however, as adhesion had taken place, it was perceived that no danger from this source was to be apprehended; and although during the past winter he has slept in a room in which water has frequently frozen, and has been since repeatedly exposed during some of the coldest days, he finds that the temperature of the organ is never greatly diminished.

The cicatrization of the wound in the forehead was greatly retarded by the cold weather, and less than half the time would have been required, had the operation been performed during a warmer season; when it had diminished to a small size, and cicatrization, as frequently is the case in the filling up of large wounds, seemed to have been arrested, great benefit was found from the use of an ointment composed of six drops of creosote to an oz. of simple ointment. On the application of this to the wound, the effects were at once apparent. A small pellicle formed over its whole surface, which was shortly replaced by a firm, consistent cicatrix.

In one or two cases operated upon by Dieffenbach, much swelling took place in the new formed nose the day after the operation, arising from the difficulty of the blood, which had entered by the arteries, being conducted off by the veins. In one case the nose became so enormously distended, that it was feared the adhesions would be entirely destroyed, and it was only by the repeated application of leeches, 70 or 80 being employed in the course of 48 hours, that this danger was finally avoided. In the present case, from the extension given to the incision on the left side, care being taken that traction should not be made too forcibly on the part, so as to compress the pedicle at its base, the circulation was, from the first, unobstructed.

In the account of the foregoing case, it has been attempted to bring forward some of the most important points which might be of service as a guide to future operators ; and if the author has been so fortunate as to throw any new light, however small, on the operation, he will feel that he has rendered a service to science and to humanity.

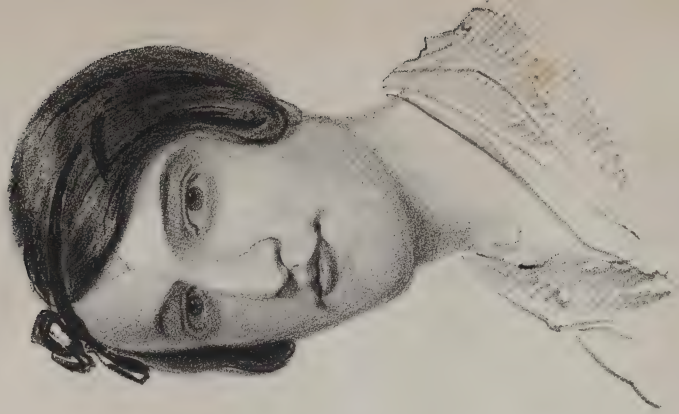
Boston, March, 1837.



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CASE II.

THE young man who was the subject of this operation had been affected for 15 years with a very troublesome disease, which bears many of the marks presented by what has usually been described under that form of lupus, which proves destructive by interstitial absorption. The commencement of this affection was by a spot on the very tip of the nose, which gradually extended, becoming finally of a livid red color, and having its surface covered by numerous elevations of a tubercular appearance. In his ordinary state of health, and when perfectly quiet, the only sensation in the affected part was that of an uncomfortable heat and itching; but on the slightest derangement of the system, and upon any extraordinary exertion, particularly when engaged in his ordinary occupations, which are those of a farmer, an intense burning and stinging sensation was produced not only in the nose itself, but extending to the surrounding integuments, and this often so insupportable as to oblige him to desist from his work, and have recourse to some cold topical application, in order to gain a temporary relief. He has gone through a great variety of treatment, continued for a number of years, but without the slightest alleviation to his sufferings. A year since he had a caustic application made to the part, which destroyed the skin for the space of one or two lines, and the subjacent cartilage, the greater portion of the disease remaining undisturbed.

He came to Boston under these circumstances, determined to have the part removed, and the loss of substance supplied by the Taliacotian operation. At this period the nose had a very pinched appearance, the skin being of an intense red towards the tip, and having in its substance a number of hard, tubercular bodies. A slight redness extended over the ala nasi of the right side. In the centre was a depression and loss of substance, where the caustic application had been made.

He was seen, previous to the operation, by a number of medical gentlemen well informed in the diagnosis of diseases of the skin, and the only name which could be given to this affection was that which has been already stated; though it differed materially from lupus in many particulars, especially in its long-continued freedom from ulceration, the great suffering attending it, and the absence of any affection of the mucous membrane of the nose.

The operation was performed on the 8th of April, in presence of Dr. Salisbury, Dr. Gordon, Dr. Mifflin, and some other medical gentlemen. The disease, which extended up as far as the nasal bones, was very carefully removed, and the cartilages below, not destroyed by the caustic, found to be in a perfectly healthy state.

The dimensions of the flap necessary to supply this loss of substance were now carefully taken, and marked out on the fore-arm. The traces were made on the radial side of the left arm, about two inches from the styloid process of the radius, and extended over to the space midway between the bones of the fore-arm. This flap was dissected up, including, with the skin, the sub-cutaneous cellular membrane, and was secured in its new situation, in contact with the face, by means of five points of the interrupted suture, the arm being firmly fixed in this position by appropriate bandages. An elastic tube was given to the patient, to use whenever he required to take nourishment—the mouth being so covered up as to prevent food being directly introduced into it. He was placed in bed, and supported in a sitting posture by means of a common bed-chair.

I saw him in the evening, and found him much less disturbed than could have been expected, considering the very restrained position which it was necessary for him to maintain.

On the following day, the 9th, there was some appearance of erysipelatous inflammation on the bridge of the nose; he had been pretty quiet, and had slept a little, but required constant watching to prevent him from slipping down and doubling himself up in the bed, to which there was a constant tendency. He complained much of a want of solid support to the elbow, and for this purpose a wooden apparatus was constructed and placed across the bed, which served as a firm resting place for the arm, and enabled him to maintain more easily the proper position. The pulse was 60, and throughout the whole period of his confinement it remained below the ordinary standard. On the 10th he complained less of his arm, but was exceedingly restless. During the day he was removed to an easy-chair, and the change afforded great relief.

The state of things varied little from that already described until the 5th day, the period appointed for separating the connection between the arm and face. On this day the base of the flap was divided, and a perfect adhesion was perceived to have taken place between the parts which had been placed in apposition.

The wound in the arm was dressed, and a small portion of the skin

which projected bound down in its place by adhesive straps. The irregular portions of skin being removed, a slight compression was exercised on the edges around the nostrils, by means of small strips of adhesive plaster.

The arm, on being relieved from its confinement, was at first somewhat stiff, but not so painful as might have been expected, and what was not a little curious, obstinately refused to be raised up again to the position it had so long unwillingly occupied. This, in a great measure, arose from a loss of power in the flexor muscles, from want of exercise of their functions; in the course of a few days, however, it regained its healthy state of feeling and motion.

By the 20th of April the newly-transplanted skin had contracted to nearly the natural size, the line of union with the skin of the nose was perfectly lineal, all the abrupt and useless portions of skin on the lower edge of the nose had sloughed off, leaving a perfectly even and rounded edge to the nostrils.

On the 23d I was surprised, on removing the green cot which covered the dressings, to find that the whole cuticle of the restored part had peeled off, leaving the surface quite raw and covered by the green-coloring matter of the silk. This at first seemed a circumstance destined to embarrass the case and prolong the period of recovery, but in its termination proved of material benefit; a slight suppuration commenced, which brought down the skin to a natural thickness, and rounded off, in the most perfect manner, every inequality on its surface, and seemed also to melt the skin into the adjacent integuments so as almost to destroy the traces of the transverse line of union. A new cuticle rapidly formed, and by the end of the month he was quite well, and was presented at one of the meetings of the Society for Medical Improvement. The newly restored part still remains somewhat wanting in color, but in all probability by exposure to air and sun, it will soon assume the appearance of the surrounding integuments. Even now it requires that attention should be particularly directed to the part, to show that any operation has ever been performed.

Remarks.—It will be perceived that in this case, the old operation, as performed by Taliacotius, of taking the desired integument from a distant part of the body, was preferred to the Indian method, in which the skin is borrowed from the forehead and hairy scalp. The reasons for this will be perfectly obvious. The loss of substance to be supplied was, in the case under consideration, small, when compared with those in which the

whole organ has been destroyed; by the course resorted to, a scar on the forehead was entirely avoided, and that made on the arm, from the great extensibility allowed in bringing together the parts, has now become so small as to be scarcely perceptible.

The operation was not precisely that recommended by the Italian surgeon. Taliacotius preferred taking the skin from the arm near the insertion of the deltoid muscle, and by adopting this method the limb can be much more securely fixed in contact with the head. In the present case, the patient was desirous of having the operation performed as speedily as possible, so as not to be detained from his occupation longer than was absolutely necessary, and fear was entertained that if the arm was suddenly brought up to the required position, without previous training, the suffering produced might not only be insupportable, but that paralysis of the limb might be the final result.

This operation differed also from that of Taliacotius in the early period at which the transplanted skin was separated from its connections—that is, on the fifth instead of the fourteenth or fifteenth day; and as the principal objection to this method is the position in which the arm is so long and painfully confined, this is certainly a very important consideration. It will also be remembered that the Italian surgeon did not at once dissect up the flap and confine it in the situation it was finally destined to occupy; but it was raised gradually, and thus allowed to suppurate and contract, and by this means become better adapted for the formation of the new nose; the most important point, however, the adhesive process, must by this means have been rendered much less to be depended on.

The print accompanying this paper will afford some idea of the position of the patient while the process of adhesion was going on. No drawing has been added of the appearances of the disease before the operation, as this could only be represented by a very highly-colored engraving.

Shortly after the above was written, the patient having exposed himself to the sun during a walk out of town, experienced considerable itching in the right ala of the nose, where, it will be remembered, there was a slight redness remaining. He came to me, very desirous to have the skin of this part at once removed, as he greatly feared that he might be troubled with it hereafter. He was also anxious that the experiment should be tried of cutting a piece of skin from the arm and immediately placing it in the wound to supply the loss of substance. Although I

did not consider this part of the operation necessary, as the wound, in all probability, would have filled up by the granulating process, I yielded to his desire and made the attempt. The skin covering the alar nasi was removed so as to leave no appearance of redness remaining, and a piece of skin being immediately dissected from the fore arm, was confined in the wound by means of lint moistened in blood, which answered a much better purpose than the common adhesive plaster.

On removing the dressing, at the end of four days, a perfect union was found to have taken place.

Boston, May, 1840.

CASE III.

RHINOPLASTIC OPERATION.—The publication of the following case has been delayed until the present, in order that sufficient time might elapse to enable us to form a judgment of the final effects of the operation. As eighteen months have now passed, and no material change will probably hereafter take place in the restored organ, it seems an appropriate time to give the facts to the public.

The patient, a young woman 27 years old, from Maine, applied to me under the following circumstances. Nearly sixteen months previous, having been troubled by a wart on the end of the nose, she was induced by her friends to apply for advice to one of those quacks, styled *cancer doctors*, who easily persuaded her that the affection was of a cancerous nature. A caustic application was advised, which produced so great a degree of inflammation as to alarm her and oblige her again to have recourse to him. His answer was that the application should be continued—not only to the wart itself, but over the adjacent parts—“so that none of the *roots* of the disease might escape.” It was therefore persevered in, and so faithfully, that at the end of a fortnight all the fleshy part of the nose sloughed off, leaving the patient in a most deplorable condition. On re-application to the quack, as to what was to be done under these circumstances, he assured her that it was a most happy termination of the disease, which by these means had been wholly eradicated, and that the nose, in the course of time, would *grow out again*, and be perfectly restored.

These assurances, as may well be conceived, were not destined to be realized; the edges of the wound gradually cicatrized, leaving her in the state in which I saw her sixteen months after the occurrence of this calamity.

The state of the patient was much as follows :—The end of the nose, together with the *alæ nasi* and corresponding portion of the septum, was entirely destroyed, leaving the nasal passages wholly exposed; the *ossa nasi*, with a small portion of skin covering them, remained entire—their edges being lined with a firm, and somewhat vascular cicatrix. In other respects, the patient was a good-looking woman, and her health as little disturbed as could have been expected, considering the sedentary life she had led since this misfortune.

It was with much reluctance that I undertook to give her any encouragement, for reasons which will be easily appreciated. In the first place, the probability of success in an operation so as to realize the hopes entertained by the patient, was very doubtful; in the second place, the long confinement necessary for an operation of this character; and, finally, the great suffering attendant on it.

By these representations, however, she was not at all daunted—if any reasonable hope could be entertained of having her condition improved by an operation, she was determined to have the attempt made. She was advised, therefore, to return home for the present, and to come to Boston again at a period of the year more favorable for the operation than the heat of summer.

Two methods of operation presented themselves in this case:—the Indian method, in which the skin of the forehead is employed in the construction of the new nose; and the Italian method, of borrowing it from some other part of the body. After much deliberation, the former was decided upon as being the most certain where the skin required to be transplanted was so large in size, and also as being the one in which I had the most experience.

The patient did not arrive in town until the first week in November, and the operation was performed on the 17th, in the presence of Dr. Hayward and Dr. Hale of Boston, Dr. McKean of Brunswick, Dr. John C. Warren, and a number of medical students. The patient was placed in a recumbent position, with her head well supported by pillows. The dimensions of the flap to be removed were traced on the forehead, nearly one third larger in size than was necessary for the formation of the new nose; this included all that portion of the skin of the forehead lying between the temporal processes, ascending almost to the commencement of the hair, and the portion to be used in the formation of the columna of the nose was almost exclusively taken from the hairy scalp. The flap, thus marked out, was carefully dissected up, and every precaution taken to leave the pedicle of the skin, between the eyebrows, sufficiently large to allow of a free vascular communication being maintained with the adjacent parts. Care was also taken to leave the angular arteries unwounded, as upon these the principal means of support to the flap depended. Before proceeding farther, the edges of the wound in the forehead were approximated by means of the twisted suture. This was facilitated by the incision in the scalp being prolonged to a pyramidal form.

The cicatrix covering the nasal bones was now removed, the flap twisted round and secured in its place by means of a number of points

of the interrupted suture. The strip which was to form the columna of the nose was deeply implanted in an opening made for it in the upper lip; the whole was supported by small strips of adhesive plaster, and covered with lint, for the purpose of preserving, as much as possible, its temperature; small tubes were introduced into each nostril, to prevent the adhesion of the opposed surfaces.

The whole of this long and painful operation was supported with the most admirable fortitude; and not a single groan was extorted throughout the whole course of it—so that considerable anxiety was experienced, at some periods, that she had fainted, and it was necessary to make frequent inquiries to determine whether or not this was the case.

During the operation, a number of arteries were cut, and bled freely; but as it was desirable to avoid the use of ligatures, they were allowed to bleed, until they voluntarily ceased. The patient was directed to keep in bed, to remain perfectly still, and to breathe through the mouth; in order to favor this, a wedge of cork was secured between the teeth whenever any disposition to sleep was manifested.

I saw her four hours after the operation. She then complained of some sense of tension in the scalp, and a slight hemorrhage had occurred from the free edges of the new nose.

On the following day the nose was considerably swollen; pulse 72; she was rather restless. Some inflammation, apparently of an erysipelatous character, made its appearance about the forehead towards evening; this was attributed, partly, to the want of free ventilation in the room. On the following morning, however, not finding any abatement of the inflammation, I removed all the dressings from the head, together with the pins which confined the edges of the wound in contact. On the 21st, the sutures were removed from the nose, and an entire union to the adjacent parts had taken place. Upon questioning the patient as to the sensibility in the new-made organ, she states that it is nearly natural, and but slightly referred to the part from which the skin had been transplanted, as was the fact in the case formerly reported in this Journal. The form of the new nose is good, with a regular curved outline; the *alæ nasi*, also, are well defined; the whole, however, still much swollen. The nostrils are kept open by means of the small tubes, which are removed daily, and cleansed from the mucous and purulent secretions which tend continually to obstruct their passage.

The wound in the forehead was dressed daily with the creosote ointment, which remedied, in some measure, the *fœtor* arising from the supuration of so extensive a wound. The patient also derived much comfort from a creosote gargle for the purpose of purifying the mouth.

On the columna of the nose, which, it will be remembered, was taken from the scalp, hair still continued to grow; but it was easily removed by scissors, so as to be hardly perceptible.

From this period she gradually gained in strength, so as to be able, in a few days, to sit up. The wound in the forehead slowly cicatrized, and the nose assumed a more natural appearance. At the end of two months, the third drawing, which accompanies this paper, was made, and affords a good idea of her appearance. A small opening still remained at each side of the nose, which, together with the slight wrinkling caused by the twist in the flap, it was proposed to remedy at a future period, when all the parts had fully come to their bearings. She was, therefore, advised to return home to her friends, and in the following spring I performed the comparatively trifling operation which was required for confining the pedicle down in its place. The cicatrix of the forehead was then quite firm and easily concealed by the hair; her health tolerably good, though she suffered somewhat from confinement. She seemed to be quite satisfied with the results of the operation. The following extract from a letter, written lately by her physician, dated April 6th, will give some idea of her state at the present moment.

“Her general health is much better than when she returned home (except a slight cold which has called me to visit her to-day), and the restored part has improved in its appearance. It has diminished a little in size, and the color has become more like the other parts of the face. The sensation is quite natural, but very little referred to the forehead, and the circulation good. The sense of smell the same as before, and not at all affected by the operation. The hair yet grows on the end of the nose, but more scattering than at first; she will, I think, be able to destroy it entirely. She covers nearly all the scar on the forehead with the hair, and were it not for that made by the suture between the eyebrows, it would hardly be noticed. A small fissure still remains open at the right side of the nose, which is not noticed but by a close examination; it might be closed by taking out a small strip, and it would improve the appearance over the nasal bones, which are rather loose.”

He also states that there is still a disposition in the nostrils to become closed. This might easily be remedied by a slight operation, consisting in the removal of a strip from the circumference of the nostril.

Remarks.—The operation, in this case, with some slight exceptions, resembled the one reported in this Journal two years since. It will be remembered that in the first operation the twisted suture was used for

confining the new nose in its place, according to the method of Dieffenbach. In the present instance, however, the interrupted suture was substituted, and answered a much better purpose, the points of ulceration on the removal of the threads being less.

The sensations in the new nose being referred to the place from which the skin has been borrowed, has been denied by some writers. In both of these cases, however, this morbid state of the sensations existed, but much less in the latter, from the very free vascular communication which was preserved by means of the large pedicle of skin connecting the nose with the neighboring parts.

It may not be uninteresting to those of the profession whose attention has been attracted to the first case, which was published in March, 1837, to learn the present state of that patient. We saw that young man a few days since, and do not find that any sensible alteration has taken place in the restored part since the case was reported. The shape of the nose is perfectly preserved, and none of that flattening has taken place which has usually been brought forward by the opponents of this operation, as one of the greatest objections to be preferred against it. In those cases where this finally occurs, it almost universally arises from the flap, in the first place, being too small in size ; and the internal surfaces not being well opposed, adhesion fails, and as soon as all swelling subsides, the nose is left flat and deformed. In the present instance, the operation has been almost a new life to the patient, restoring him to the society of his friends, and enabling him to establish himself in business, which, in his previous situation, was utterly impossible.

The result of the above cases fully establishes the propriety of the operation, and the possibility of so far restoring the lost organ, as to make it difficult to discover the traces of the restoration, unless the attention be particularly directed to it.

Autoplastic operations for the restoration of parts that have been lost either by disease or from accident, are now attracting much attention both at home and abroad, and they may be had recourse to in a number of cases which previously had been given up as wholly incurable. It would be going too far beyond the limits of this paper to mention all the cases to which these operations might be applied ; we therefore refer to a few only. Among the most important of these, may be instanced the operations for restoring the lower lip and the eyelid after the ablation of cancerous tumors, frequently practised by Dieffenbach ; and in cases of

fistulous openings of the larynx and trachea, of the vagina and urethra, cases where the mere bringing the parts together, or making raw their surfaces, as in the hare-lip operation, almost invariably fails in performing a cure. The autoplasmic method which has been most generally adopted as applicable to these cases, is that in which the flap required is taken in the immediate neighborhood of the part destroyed, slid along, and confined in the desired situation by the twisted suture. This has been called, by the French, "*autoplastie par glissement du lambeau*."

The following cases operated on during last year will serve to illustrate this method. The first patient was a young man who had ~~lost a~~ portion of one side of the nose from a burn, the septum and bones of the nose being destroyed by the same accident, and the external opening of the nasal cavities entirely obliterated in the subsequent cicatrization of the parts. The operation was commenced by removing as much as possible of the cicatrix covering the nostrils. A flap of skin, of a triangular shape, was then dissected up from that part of the cheek immediately adjoining the ala nasi which was to be restored; this was slid along and confined, by means of sutures, to the edges of the nose, from which a slip of integument had been previously removed. Union by the first intention took place, and at the end of a week the base of the flap was divided by a circular incision, which, besides diminishing [the tension of the parts, simulated pretty well the circular depression on the cheek which bounds the alæ nasi. The operation was terminated after a fortnight's confinement; the appearance of the young man was much improved, and the power of breathing through the nostrils restored. The bridge of the nose, from the partial destruction of the bones, still remains depressed, but the circumstances of the patient not allowing of a long detention from business, it was not thought advisable to proceed to any further operation for the present.

The second case, a congenital fissure of both the hard and soft palate, will be viewed with some interest from the novelty of the operation.

The young man who was the subject of it, was 24 years of age, and his speech so much affected by this unfortunate conformation as to make him scarcely intelligible, except to those accustomed to his manner of speaking.

The operation was commenced by making raw the edges of the soft palate, after the method usually employed in cases of staphyloraphy, and three points of suture introduced. The mucous membrane covering the roof of the mouth was then carefully raised on each side of the fissure in the hard palate, brought across this opening, and confined by means of

the interrupted suture. The flap formed by the mucous membrane of the mouth, it should be understood, was continuous with that of the soft palate. A firm union took place throughout the whole extent, with the exception of a small portion at its upper angle ; the suture being torn away at this point on the third day succeeding the operation, from violent efforts in coughing.

The patient has now returned to the country, and has been recommended to touch the edges of the small opening which remains with the nit. argenti, with the hopes of obliterating it by this means ; if, however, this should fail to succeed, a second operation is proposed for repeating the same process in the remaining part of the fissure.

This case will be given in detail hereafter, when the proposed operation has been put into execution. It will serve for the present to illustrate the points under consideration, and also establishes the fact of the possibility of an adhesion in cases of fissure in the soft palate, although complicated with an extensive separation of the bones—a point hitherto denied by writers on this subject.

Boston, May, 1840.

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LIGATURE
OF
BOTH CAROTID ARTERIES
FOR A
REMARKABLE ERECTILE TUMOUR
OF THE
MOUTH, FACE AND NECK.
BY J. MASON WARREN, M. D.,
ONE OF THE SURGEONS TO THE MASSACHUSETTS GENERAL HOSPITAL.
WITH TWO PLATES.

[From the American Journal of Medical Sciences for April, 1846.]

ALBERT TABUR, from Maine, 23 years old, consulted me on October 1st, 1845, for an enormous tumour of the lower lip and tongue, which had supervened on a mark occupying a good part of the face, and neck, and now presented the following appearances.

The head of the patient was larger than common: the left side of the face was almost wholly occupied by a discoloration, which was originally less extensive and lighter coloured, but had now attained the extent and appearance above mentioned. The right side presented a discoloration about half the extent of the left. The lower lip was much enlarged, everted, and gave three aspects: externally, the thick tumefied lip; internally, a fungoid tumour, covered by red granulations distended by blood, as if ready to break through; the whole surmounted by an irregular ulceration with thickened edges and a hardened base. The red granular appearance extended underneath the tongue through the ranular space to the inferior surface itself, the left half of which was enlarged to double its natural size and partially protruded between the teeth; its upper part being the seat of five or six small ulcerations. The discoloration of the face also extended on the outside of the lip downwards over the chin and neck, covering a space of seven or eight inches in diameter, as represented in Plate I; the whole, especially that on the face, being rather more full and distended with blood than natural.

The history of the case was this. The mark, as above stated, was congenital. About four years since the lip and tongue began gradually to swell, and the former very shortly ulcerated. The ulceration has occasionally healed since that time, until the last year, when it has been permanently enlarging. On making pressure on the lip the blood can be gradually expelled, returning again immediately on the pressure being withdrawn. The same is the case with the tongue. Since the erectile tissue has been developed in the lip the discoloration of the face has become more marked, has extended, and is evidently partaking of the character of the erectile tumour in its neighbourhood.

This case was evidently a very critical one, and the two most prominent dangers which appeared to threaten him were these: First, a cancerous degeneration of the ulcerated lip; and, secondly, alarming hemorrhage, which was likely sooner or later to take place, and which must, in all probability, prove rapidly fatal.

The following is the course I proposed to him, in consultation with Dr. John C. Warren: 1st, to have the left carotid artery tied; 2d, after a considerable interval of time to tie the right carotid; 3d, to attack whatever portion of the tumour remained by means calculated to produce contraction of the vessels and obliteration of the erectile tissue.

To this course, after weighing well all the dangers connected with it, the patient agreed, and on Oct. 5th I tied the left carotid artery. He recovered from the operation, and was out in about ten days. At that time the face had become more pale, the erectile tissue and the large tumour of the lip had very much diminished in size, and the painful ulceration which surmounted it was rapidly healing. The patient seemed to be in perfect health. He was advised to go home, remain three or four weeks, and then return to have the other carotid tied: in the meanwhile to apply a strong solution of the sulphate of zinc, by compresses, to the inside of the lower lip.

Nov. 7th.—When the patient returned from the country, it appeared that the tumour of the lip was diminished one half. The fullness of the face and neck was less; the discoloured parts were much paler than when he left town. The size of the tongue was less, and the ulcerated spots on it had quite healed. His health remained good. It was determined, therefore, to proceed at once to the ligature of the carotid of the right side.

The day previous to the operation, I made a compression on the artery for about five minutes without any obvious inconvenience to the patient, and with much encouragement to myself as to the event of the next operation.

The patient being placed in a sitting posture, the carotid artery was laid bare, and a ligature passed under it. It was dilated about one-third more than its natural size. He was then placed on his bed, with the head slightly elevated; the state of the pulse was now explored, and found

to be 80 in the minute. The ligature was drawn tight. At first he exhibited no change, but shortly after the pulse appeared to labour, and became slightly irregular; the only symptom noticed in the patient was that he became drowsy. After waiting about fifteen minutes the second knot was tied, and the wound dressed.

No inconvenience was experienced from this operation, farther than a slight faintness during the afternoon on attempting to raise his head. He was directed to keep perfectly quiet, and to maintain strictly the horizontal position.

On the third day there was a slight soreness about the larynx, which lasted three days. He is now, Nov. 19th, at the end of ten days, in good health, and able to go down stairs. The face is much paler than before the last operation, and the morbid appearances are diminishing.

Nov. 26th.—The ulceration of the lip is quite healed; but the lip itself is still thick and somewhat everted by the erectile tissue, which enters into its whole substance.

On examination of the part it was concluded that although this swelling was gradually diminishing, yet it would not wholly disappear without a further operation; and that, as the patient lived at a considerable distance, the disease, if disposed to return, might get beyond control before the proper remedies could be applied to check its increase. I therefore determined to remove the diseased portion of the lower lip by a V-like incision. Previously to this, and in order to avoid hemorrhage, I performed the following operations.

A cataract needle was plunged into the vascular texture on the left side, and carried in different directions, so as to break up and destroy its organization. No hemorrhage followed this application. Three days afterwards a similar operation was repeated on the right side.

Nov. 29th.—A final operation was performed. A strong compression being exercised by means of two steel forceps prepared for the purpose, on each side of the lip, so as completely to interrupt the course of blood into it, a portion not less than two inches in length at its free edge was removed by a triangular incision. At first there was not the slightest hemorrhage, the two lips of the wound remaining perfectly dry; on the compression being removed, however, blood gradually oozed from the whole cut surface. This was easily checked and the edges of the wound approximated by a number of points of the interrupted suture, and a powerful compressing bandage applied.

For the first twenty-four hours he was carefully watched. Towards evening a coagulum was found projecting from the wound, which was removed. From this time there was no farther hemorrhage, or bad symptom, and the wound healed by the first intention.

The portion of lip removed presented a spongy tissue, like the body of

a leech, and gave a sensation in cutting like a bit of diseased lung,—parts of it were indurated from the previous subcutaneous incisions. The muscular tissue had almost completely disappeared.

Dec. 12th.—The patient returned home quite well. Previous to the last operation, and after the ligature of both carotids, he was present at a meeting of the Boston Society for Medical Improvement, and on the day he left town he was seen by various gentlemen of the profession.

At this period the drawing, Plate II, was made. As will be seen, the discoloration of the face had become much paler, and that of the neck and chest had almost wholly disappeared. The ear had lost its swollen and deep reddish colour, and had become of a natural size and of a pale aspect.

No pulsation could be discovered in either of the temporal arteries, or in fact, in any of the arteries of the head. In the neck, just above the clavicle, two large arteries nearly the size of the carotids, are seen pulsating powerfully under the skin, being in all probability the supra-scapular arteries greatly enlarged.

I have had a letter from this patient since his return home, and he is now, Feb. 1st, nearly four months after the first operation, in the enjoyment of perfect health, nor has he had the slightest indications of disturbance in the brain from this great interruption to its natural circulation.

Remarks.—It is now rather more than forty years since Sir Astley Cooper first applied a ligature to the carotid artery for aneurism, and the operation at that time was looked upon with great distrust from the fear of a fatal disturbance to the functions of the brain. It has since been frequently repeated, and with as good success as perhaps any of the greater operations in surgery.

It remained to be proved, whether both carotids could be safely tied without destruction to life. One case in this country, performed by Dr. Mussey, in 1827, and two or three abroad, go to prove the practicability and safety of this operation, if done with proper precautions. The great object appears to be, that sufficient time should elapse between the ligature of the carotids to allow the collateral vessels which supply the brain to be dilated, so as to carry the quantity of blood required for the performance of its functions.

In Dr. Mussey's case, the second ligature was applied at the end of twelve days, and without any uncommon symptoms on the part of the patient. Eight years afterwards he was well, although occasionally troubled with cerebral plethora.

Professor Kuhl, of Leipsic, tied the left carotid artery in a man 53 years old, for the cure of an extensive aneurismal disease of the scalp. This patient had convulsive motions and vomiting during the operation. A profuse hemorrhage from the tumour rendered it necessary to secure the right carotid artery on the 41st day. The patient recovered, but not until after

hemorrhages from the tumour, and suppuration, and considerable trouble in the cerebral functions. Two other cases have been given by the *London Medical Gazette*, as performed by Mr. Preston, of India, for some disease of the brain. In one case the second ligature being applied at the end of eleven weeks, and in the other at the end of four weeks. In these cases, although the condition of the patient was not improved by the operations, no severe symptoms on the part of the brain followed the obstruction of the blood through these vessels.

Other cases may be adduced, in which both carotid arteries have been obstructed by disease, such as aneurisms, or other tumours in their neighbourhood, without destruction of life. These show, that if the nature of the case forbids a resort to any of the other resources of surgery, this operation offers a reasonable chance of success and safety to the patient.

To the cases that are mentioned of partial obstruction of the vessels supplying the brain, the following very interesting one, in which all the large vessels going to that organ were cut off, is given by Dr. Davy.

"The subject of this case was an officer of high rank, about 55 years of age, who first began to suffer in health after an attack considered to be rheumatism, in 1831. In Sept., 1835, he was taken suddenly ill, with a tendency to syncope and vertigo, frequently returning; but after this his general health grew better; he experienced vertigo seldom, and syncope never. It was now observed, that he had no pulse at either wrist, or in the brachials. His disease was now clearly perceived to be aneurism of the arch of the aorta, with an obstructed state, it might be inferred, of the great vessels arising from it, for no pulse could be felt anywhere in the course of those vessels, in the neck, temples, axilla or wrist. This gentleman expired suddenly, while traveling, on Jan. 11th, 1837. Upon examination of the body, the aorta was found ruptured near its base, within the pericardium. The arch of the aorta was the seat of a large aneurism filled with coagulum. All the great vessels arising from the arch were completely closed up at their origins. The upper portion of the innominate was open; the right carotid and subclavian were also open, but rather diminished in size; the left carotid, subclavian and vertebral arteries, as far as they were examined, viz., to the extent of two inches, were impervious, being plugged up with lymph. The intercostal arteries were observed to be large."—*Lond. Med. Gaz.*

Having shown by facts the ground on which an operation of this kind is practicable and of a reasonable application, we are led to look at the propriety of adopting it in the present case.

It was evident, in the first place, that the patient's fate was inevitable either from cancerous degeneration or hemorrhage, or both combined, unless some sure and active means were adopted to arrest the disease. If the disease had been situated at a great distance from the vessels to be ligated, on the scalp, for instance, there would have been a question, as

will be shown by a case in the sequel, whether the supply of blood might not be kept up by a collateral supply through the vertebral arteries, by means of the ophthalmic. In the present case no danger of this kind was likely to give cause for immediate apprehension, and the active part of the disease might easily be extirpated before the anastomosing vessels from other quarters had begun to supply the tumour,—an opinion supported by the event.

The attempt to remove the lip without the ligature of the carotids, would probably have been attended with fatal hemorrhage, and even if the patient had escaped this accident, it would have left much diseased tissue remaining.

I have, however, twice attempted this operation in aneurism by anastomosis of the upper lip, where the disease has been partial. One of these cases is described in Dr. Warren's work on Tumours. The individual had a large red mark occupying nearly one-half of the left side of the face. During his childhood the upper lip on that side had commenced enlarging, until it had finally formed a permanent tumour, hanging down and obscuring the under lip; the gums had partaken of the disease; had become spongy, and with the rest of the diseased mass were bleeding on the least injury. About two-thirds of the upper lip was affected. I removed the whole of this by means of two incisions made in the adjoining sound textures. A triangular piece being thus included, a number of dilated vessels, which supplied the erectile tissue, were tied, and the only hemorrhage which was troublesome arose from the angle of the wound, where the disease had extended up into the nostrils. The inflammation which supervened on this operation was sufficient to obliterate the morbid tissue, which extended about the mouth and in its neighbourhood. Three months afterwards almost exactly a similar case of disease presented itself to me on the right side of the face, which was successfully treated in the same manner.

The following case, treated conjointly by Dr. John C. Warren and myself, confirms the remarks with regard to the ligature of the carotids, and also possesses many other points of interest.

Remarkable case of aneurism by anastomosis successfully treated by various operations.

The subject of this case is Asa Porter, an inhabitant of Nova Scotia, a healthy man, ætat. 33. He has on his forehead, principally below the roots of the hair, a little to the right of the median line, a soft, pulsating, irregular tumour about three inches in diameter, and from a half to three-fourths of an inch in thickness, which gives him a very formidable aspect.

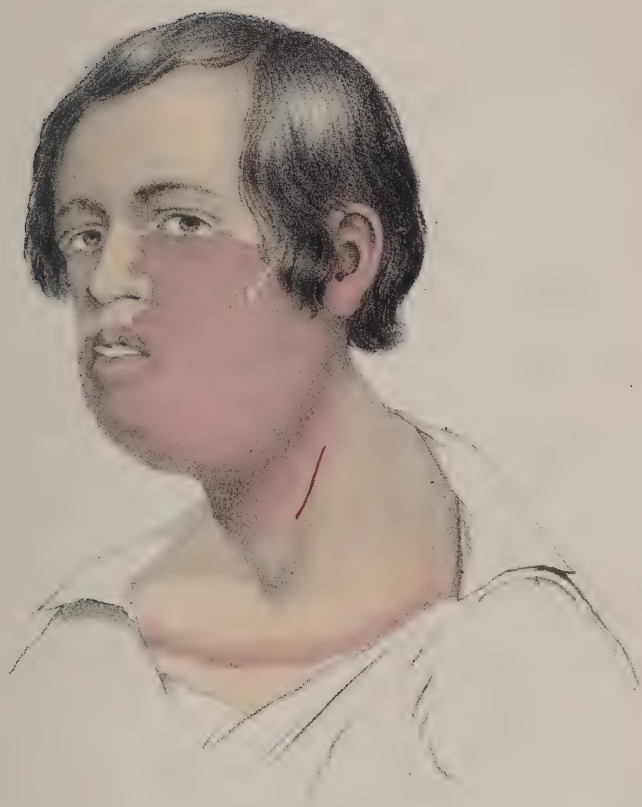
This tumour is of a reddish colour, becoming redder and larger when the patient is excited, either by bodily exercise, or mental disturbance. It appears to consist of coils of vessels. It is easily compressed, and on

Pl. I.



Lith. of Sinclair, Philad.

Pl II.



Lith of Sinclair, Philad^a

removal of the pressure immediately enlarges again. A number of pulsating blood-vessels are seen to enter it from different directions, principally on the right side. Of these may be distinguished, first, the temporal artery, which is in a very enlarged and tortuous state as far down as the lower part of the external ear; second, a branch of the temporo-frontal artery; third, the facial or angular artery from the internal commissure of the eyelids. On the left side are seen the left temporal artery, which is nearly as large as the right, and the left facial artery, which with its fellow, the artery of the right side, and its accompanying veins, forms a vascular tumour at the root of the nose. The veins themselves are of an enormous size, passing down from the tumour on either side of the nose, covering and partially obscuring the internal commissure of the eyelids. Besides these vessels, the whole scalp in the neighbourhood of the tumour seems alive with smaller arterial trunks, which are seen pulsating in every direction.

On compressing the temporal arteries, pulsation in the tumour is much weakened, and when, in addition to these, the facial arteries are also compressed, pulsation ceases, and the tumour becomes flaccid.

This tumour began sixteen years ago, without any known cause, by a small reddish spot on the right side of the forehead. It has gradually increased till lately, when this increase has been more rapid, especially within the last fortnight. There is an occasional throbbing of the carotid arteries, particularly that of the right side. The patient is also subject to distressing headaches, accompanied with increased action of the blood-vessels of the tumour, and of the head generally. This vibratory action of the arterial system of the head, neck and upper extremities is quite remarkable. He is incapacitated by it from all active exertions, and is therefore ready to undergo any operation that promises to relieve him.

The course of this tumour, if not arrested by surgical treatment, can be readily foreseen. The morbid action will gradually involve other vessels, until the whole scalp becomes filled with enlarged arteries. The vessels of the eyelids, of the face generally, and even of the interior of the mouth, are likely to be involved in this diseased action. The patient's condition will, in this way, become almost insupportable, and his life will, perhaps, be hazarded by the rupture of the tumour, which now seems almost ready to take place.

What means should be adopted to arrest its progress? Those which naturally present themselves in the first place, are of two descriptions:—First, ligature of the carotid artery. But in this case the ligature of a single carotid might not suffice to arrest the flow of blood into the tumour, since the vessels which supply it, although principally from the right, are partly from the left carotid. The ligature of both carotids would therefore be necessary; but the result was less likely to be successful than in the preceding case, on account of the greater distance of the tumour from the

arteries tied, and from the probability of its having other means of supply through the vertebral arteries, which inosculate freely with the branches of the internal carotid, the ophthalmic in this case being unusually dilated. The second mode of operating which suggests itself, is to expose the different vessels supplying the tumour, and pass a ligature upon them. The objection to this course is the length of such an operation as the exposure of so many vessels would require. Are there any other means that can be devised besides these two? The tumour is much too large to admit the safe and effectual application of caustic. It cannot be cut out without the most dangerous hemorrhage. It is too large and too much connected with the bone to admit the application of ligature *en masse* in its present state.

Oct. 31st. Having compressed, on the right side, the temporo-frontal and two temporo-parietal arteries, and on the left side the continuation of the temporal artery through the frontal region, and the temporo-parietal, the pulsations of the tumour appeared to be arrested, and its contents were readily expelled through the large veins, running into the facial vein. Observing this we determined to interrupt the circulation through the five vessels first mentioned, three on the right side, and two on the left. Instead of exposing and taking up these vessels in the usual way, Dr. J. C. Warren suggested that much time and loss of blood would be spared by passing needles under them. This was accordingly done, and the arteries were compressed by a ligature thrown over the needles in the form of a figure of 8. After this the pulsation of the tumour was much diminished. Venesection was then performed, and the patient placed in bed with his head elevated.

Nov. 6th. The needles were removed. Very slight soreness had been experienced from them. The tumour is diminishing in size; the vessels constituting it appear more flaccid and compressible. The soreness and all the uncomfortable sensations connected with it are lessened.

12th. The pulsations in the right and left temporal arteries still continuing, a needle was passed under each of these directly above the ear, after which the pulsation subsided, and also the general sense of beating about the head. The patient is much more comfortable.

21st. In consequence of a slight bleeding from the wound of a pin inserted on the 16th, we thought it best to obstruct the vessels on the anterior, and on the internal part of the tumour, and passed pins in each of these situations. There is now no pulsation in the tumour; the tenderness existing on the upper part before any operation has been increased. He had a chill from going into another room in the house; since that has had some fever.

22d. At this date there was a sudden rupture of the tumour attended with considerable hemorrhage. Being hastily called to the patient, I passed two large pins at right angles with each other under that part of the tumour from which the hemorrhage was taking place. A ligature

was carried around under the needles, and being tightened, the bleeding was effectually checked. It was to be feared, however, that as the pins ulcerated out, the hemorrhage would recur. There being a want of accommodation in his lodging, and in order that he might be more carefully watched in case of a second rupture of the tumour, he was advised to go to the hospital, where he came exclusively under the care of Dr. John C. Warren, to whom I am indebted for the remaining history of the case.

25th. The pulse is now natural, 75; the internal sensations are much improved; there is no vibratory motion of the arteries of the head, and none is discoverable in the tumour, though a pulsation still exists. A slight œdema extends from the tumour to the nose, and to the eyelids. Occasionally a drop of blood starts from the needle wounds. From time to time leeches have been applied with great relief.

30th. On this day a vessel was discovered running from the left temporo-frontal artery across the left eyebrow, communicating with a branch in the angle of the eye on the right side, thence running up along the left edge of the tumour, till it reached its superior posterior border. It did not produce a pulsation in this part of the tumour, but skirting along its edge for some distance, as it did, there was a strong probability of its sending vessels into the morbid mass, thus tending to keep up the morbid action. The needles, which were inserted by Dr. Mason Warren on the 22d inst., caused an inflammation and induration of the tissue in their neighbourhood, and were removed without hemorrhage.

As compression of the artery rising on the forehead, checked the specified pulsation, it was determined to tie up this vessel. A needle was accordingly passed under it on Dec. 1st. Before placing the ligature, the vessel was compressed on the needle, without interrupting the pulsation along the edge of the tumour. Another needle was therefore passed under that part of the artery, where it penetrated at the superior internal angle of the tumour, embracing over the needle a vascular substance at least half an inch wide. A ligature passed in the figure of 8 over this needle, suspended all pulsation. The patient had some pain, which lasted a couple of hours, after which he became quiet, and suffered no longer.

Dec. 3d. Two needles have now separated from the substance of the tumour without hemorrhage. Besides the needle passed on Dec. 1st, there still remains one needle at the lower part of the tumour, which was passed under an artery from the right temporo-frontal. The tumour, which has been hard from inflammation is now softened; its heat, except near the needle passed the last time, has subsided. There is now no throbbing in any of the arteries about the head: the carotid beats naturally. The patient is tranquil, feels well, and sits up, which he could not do for some time on account of the throbbing in the head produced by any motion. He has a good appetite. His food is restricted, however, to half a pound of solid farinaceous matter per day, and about a pint and a half of liquid.

6th. Although all pulsations are at an end, the tumour still exists but in a diminished state. Dr. Warren thought that, if left to itself, it would in all probability disappear without further applications; but, as the patient lived at a great distance, it seemed to be a duty to see that the tumour was certainly and perfectly eradicated before he went home to Nova Scotia. The best mode of accomplishing this would be by the application of caustic, which, perhaps, might be resorted to now that the great vessels were cut off, without danger of hemorrhage. This day, therefore, the use of caustic was commenced by the application of caustic potash, in a solid form, to the wound left by the separation of one of the needles. This wound was about one inch long and two lines wide. A little blood followed the application, which might have arisen from the pressure of the caustic, and therefore a portion of the same substance, in amount eight grains, was applied in powder.

16th. The caustic has been applied three or four times. Twice a slight hemorrhage has occurred, requiring an intermission in its use. A pulsatory movement having reappeared in the relics of the tumour, the application of ice two or three times a day was directed, to be continued as long as the patient could bear it. To-day the caustic was reapplied to the ulcerated surface, which is about an inch long and half an inch wide. The tumour is sensibly diminishing in size.

It will be unnecessary to proceed with all the subsequent details of this case. It is sufficient to state that the different portions of the diseased mass which remained were successively attacked with caustic potash, and with the occasional application of croton oil. Any small arteries, which were discovered running into the tumour, were treated, as in the commencement of the case, by the needles.

On April 5th an operation was performed to excise a portion of the erectile tissue, which existed at the upper part of the wound, when a large vessel was opened and required a ligature.

May 20th.—After the wound from the incision and caustic was nearly healed, a fullness was perceived at its lower angle, immediately above the supra-orbital foramen. A triangular piece of the suspicious part was therefore cut out and the supra-orbital artery tied. The whole wound after this last operation was nearly the size of a dollar. Strips of adhesive plaster were applied to approximate its edges. The wound came together with great rapidity. In a fortnight after the last incision it was healed with a lunated cicatrix, and the parts appeared perfectly sound. The patient is in excellent health, and on this day, May 20th, was discharged to return home, promising to visit us occasionally when he came to Boston.

Remarks.—In considering this case the first circumstance which presents itself is its protracted and complicated treatment. The necessity of this arose from the obstinate character of the affection. The applications first made were insufficient, and additional remedies were required under

the various appearances which occurred. Four different measures were successively adopted.

1. The large vessels were interrupted by ligatures applied in a peculiar way, *i. e.*, by needles passed under the arteries, and compression made on them by a thread in the form of a figure of 8.

2. The ligatures being insufficient to repress the action of the smaller vessels, caustic applications were resorted to for the purpose of destroying the morbid texture, and in part obliterating it by the inflammation produced by the action of the caustic. To this end a very free application was made of caustic potash, and repeated between twenty and thirty times.

3. Excision was performed of the remains of the vascular texture, after the arteries supplying it had been so far obliterated as to remove the apprehension of hemorrhage.

4. Compression by adhesive plaster and a bandage had a sensible influence in finishing the cure.

The general treatment gave important aid to the local applications. The patient was kept very still, and for the greater part of the time in bed, with the head much elevated. His food was restricted to the smallest quantity, so that he was reduced for a time to a state of total prostration of the muscular power. During most of the treatment, if a small addition was made to his food, its bad effect was generally seen in the production of arterial vibrations and the recurrence of headache. Abstraction of blood, and the use of purgatives were resorted to when necessary.

It is worthy of remark, that while erysipelas prevailed all around this patient, he was never affected by it in the slightest degree during exposure of at least three months.

In conclusion, it may be said, that this affection could only have been destroyed by a resolute and active perseverance in the various remedies, continued through all the turnings of the disease.

Boston, *Feb. 1, 1846.*

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LIGATURE
OF THE
LEFT SUBCLAVIAN ARTERY.

BY J. MASON WARREN, M.D.
ONE OF THE SURGEONS OF THE MASSACHUSETTS GENERAL HOSPITAL.

From the American Journal of the Medical Sciences.

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1849.

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LIGATURE
OF THE
LEFT SUBCLAVIAN ARTERY
FOR SUBCLAVIAN ANEURISM;

WITH A REMARKABLE DEVIATION OF THE VESSEL AND CONSEQUENT CHANGE
OF ITS RELATIONS.

BY J. MASON WARREN, M.D.

THE great mortality attending the ligature of the larger arterial trunks, and of the subclavian in particular, gives interest and importance to any case of operation on those vessels. In the latter this interest is increased by its deep situation, causing in many cases a great difficulty of reaching it, and by the importance of the organs in its immediate neighborhood. According to the valuable tables furnished by Dr. Norris, in some former numbers of this Journal, out of 69 cases of ligature of the subclavian artery, 36 recovered, and 33 died, or nearly one-half. In operations on the iliac arteries, out of 118 cases, 85 recovered, and 33 died. From 38 cases of operation on the carotid artery for aneurism, 22 recovered, and 16 died. In every instance where it has been necessary to place a ligature on the subclavian artery on the tracheal side of the scaleni muscles, the result has been fatal.

The case which I propose at present to relate, offers some peculiar points of interest, apart from the general one of the ligature of the vessel. Among the principal of these may be mentioned the fact of a ligature having been applied to the artery for an aneuris-

mal tumor situated above the clavicle, being, so far as I am aware, the first case of this kind that has had a successful result, because the recorded aneurismal tumors in that situation have required the application of a ligature within the scaleni, and the termination, as stated above, has been unfavorable. *Secondly*, the anatomical peculiarities in the relations of the vessel, to which may be attributed the possibility of the ligature on the outside of the scaleni. *Thirdly*, the rapidity with which the collateral circulation was restored, the pulse having been felt at the wrist twenty-four hours after the operation. *Finally*, the length of time the ligature remained attached, *ninety-six days*, notwithstanding all safe means were made use of to detach it.

Without further prelude I shall proceed to the description of the case.

Miss A., thirty years of age, of delicate constitution, had a congenital club-foot of the worst kind, and, in consequence, a double curvature of the spine. For the former of these she was treated eight or ten years since by Dr. Brown at his infirmary, and the foot, after the section of the tendons, followed by the appropriate treatment, was completely brought into its natural position, so that she was enabled to walk with ease, without the aid of any mechanical support. The curvature of the spine was submitted to a similar treatment with the same successful result.

At the request of Dr. Brown, she consulted me in the early part of December, 1847, for an aneurismal tumor situated just above the scapular end of the clavicle, about the size of a pigeon's egg, of which she gave the following history :

Four months previous, while in attendance on a sick brother, she had occasion to draw the cork from a bottle, and felt at the moment a sudden crack at the point where the present tumor is situated. Her attention was not attracted to it at the moment, but a short time afterwards a small swelling, having a decided pulsation, was distinguished at that spot, which has gone on increasing until

it has attained its present size. It had a powerful pulsation, and possessed the usual thrill characteristic of an aneurismal affection.

After having examined the tumor and learned its history, I endeavored to discover the subclavian artery in its normal situation beneath the clavicle, at the point where it passes over the first rib. To my surprise, no large vessel or any osseous protuberance answering to the tubercle of the first rib, usually taken as the guide to the artery in this position, could be found. Different parts of the neck were then explored, which finally led to the discovery of a large artery passing obliquely upwards, parallel to, and about an inch removed from, the external border of the trapezius muscle. Compression being made at this point, the pulsations of the tumor ceased, as well as the pulse at the wrist. There was no question, therefore, in my mind, that this was the subclavian artery, but it was more difficult to determine the cause of this remarkable anomaly.

I now sought for the first rib, and to my surprise discovered both the first and a part of the second rib passing obliquely across the neck above the clavicle. The insertion of the scalenus anticus muscle into the first rib, was at length distinguished; the tubercle, however, was not sufficiently developed to be manifest to the touch. The whole osseous system of the chest in this case seemed to have undergone a partial displacement. The spine and ribs attached had been, as it were, moved upwards; while the sternum was carried in an opposite direction.

Making a strong compression on the vessel above the tumor, the arm became extremely painful with a sensation of numbness, and on a subsequent and more careful examination the whole brachial plexus of nerves could be discriminated, in immediate contact with the artery.

As the tumor was rapidly increasing, it was evident, that, considering its situation and the great danger of delay, no time was to be lost, if any surgical operation was to be resorted to for its relief.

The patient, a person of much fortitude and force of character, agreed at once to the course advised. The operation was performed, on December 24th, in the presence of Dr. J. C. Warren, Dr. Brown, Dr. Buckminster Brown, Dr. Bartlett, of Roxbury, Dr. Morland and Dr. Slade.

An incision, about two inches long, was made, extending from near the outer and upper edge of the sterno-mastoid muscle downwards, in the direction of the scapulo-clavicular articulation, and an inch from the edge of the trapezius muscle, the pulsations of the vessel being the principal guide, as the other anatomical marks were wanting. This incision divided the skin and superficial fascia; a second cut opened one of the branches of an artery given off from the thyroid axis, which was tied. A nervous band of some size was now encountered, and at its side and directly over the artery a large vein, apparently the external jugular. The vein was carried to the upper part of the wound with a silver hook, and the nerve to the lower; the dragging upon the latter caused a disagreeable and somewhat painful sensation in the arm.

The sheath of the vessel was next opened, the cellular membrane around it cleared away, and the aneurism needle, unarmed, passed from below upwards, on account of the difficulty of introducing it in the contrary direction from the interference of the scalenus anticus, which had its insertion just below. The needle at once encountered and raised the lower nerve of the brachial plexus, which was in the most intimate contact with the artery. By depressing the handle and urging the point forwards, with careful manipulation the eye of the needle was without difficulty brought out between these two organs. The instrument was now threaded with the ligature and withdrawn. Careful exploration was made to ascertain if any nerve was included in the ligature, the painful sensations in the arm caused by drawing the ligature downwards at first leading to the supposition that this might be the case. But when the same traction was made directly upwards, no pain was felt; the former

sensations being produced by the dragging on the cervical portion of the brachial plexus, owing to their connection with the vessel.

The ligature was now tied, and the wound dressed. The pulsations in the aneurismal sac, as well as those of the radial artery at the wrist, at once ceased, and all appearance of tumor vanished. The patient's arm and hand were a little cold directly after the operation, but being rolled in flannel they soon regained their natural temperature.

25th.—Found her quite comfortable. She had passed a quiet night.

26th.—Patient states that the pulse at the left wrist returned for a time last evening, it then disappeared, but returned again, though faintly, this morning. I could not discover it at the time of my visit.

27th.—She has been somewhat troubled by occasional pains in the arm. The pulse was felt yesterday once or twice by Dr. Buckminster Brown, being intermittent. The wound has healed by the first intention. She has suffered occasionally from palpitation of the heart.

29th.—The pulse was perceived, though feebly, at the wrist, but could not be detected in the axilla. The spot formerly occupied by the aneurismal tumor, now presents an obvious depression.

Jan. 2d, 1848.—The pulse is constant at the wrist.

14th.—The ligature still remains on the artery, notwithstanding the traction daily made by the patient in accordance with my directions. A number of large vessels, taking their origin from the subclavian, exist in different parts of the neck. One of these, apparently the supra-scapular, passes directly over the sac, and pulsates so strongly as at first to convey the impression of a return of pulsation in the aneurismal tumor.

March 30th.—Once or twice in the course of the last two or three weeks, finding that the ligature on the vessel was not disposed to become detached, I have seized it with the forceps, and, holding

the artery forcibly down on the rib, have twisted the thread with considerable force. This was done for the third time yesterday, and immediately afterwards the ligature separated, *ninety-six* days after the operation.

The wound almost at once closed.

I saw this patient on September 14th for the last time. At that period she was quite well, had recovered the use of her arm, and was in no way incommoded by the operation to which she had submitted. The aneurismal tumor had in a great measure disappeared ; but it still conveys the impression of containing a fluid. Directly on its surface, and incorporated with it, is a very large arterial trunk, supposed, as above stated, to be the supra-scapular. This vessel pulsates powerfully, and at first gives an appearance of pulsation to the tumor ; but by careful manipulation can be separated from it. The pulse at the wrist still remained a little less strong than in the corresponding artery of the other side.

Boston, Nov. 1848.

To those persons who may have noticed a case of ligature of both carotids, in the April number of this Journal for 1846, an account of the state of this patient, after the lapse of three years, may not be without interest.

The object of this operation, it may be remembered, was to allow of the excision of a fungous tumor occupying nearly the whole of the lower lip, and based on an erectile tissue pervading the tongue, face, neck and chest. This tissue was rapidly increasing, and it was hoped that its growth might be arrested by thus cutting off the direct supply of blood to it.

The arteries were tied in the latter part of the year 1845, and the tumor of the lip was then excised without the occurrence of any alarming hemorrhage.

This patient I have had an opportunity of seeing within a few months, and of making some observations on the state of the circulation in those parts about the face and neck supplied by the carotids.

The situation of the temporal arteries being explored, no appearance of pulsation could be discovered in those vessels. The same was found to be the case in regard to the labial arteries. The angular arteries, where they inosculate with the nasal branch of the ophthalmic, gave the faintest pulsatory motion.

In the region of the neck were a number of large vessels having their origin from the subclavian, among which the supra-scapular was chiefly to be distinguished.

The lip was rather more full in appearance than when the report of the case was made, but free from ulceration.

The functions of the brain had not in any way been disturbed.

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AMPUTATION AT THE HIP-JOINT

FOR

A LARGE OSTEO-SARCOMATOUS TUMOR OF THE FEMUR.

BY J. MASON WARREN, M.D.



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OSTEO-SARCOMA.

AMPUTATION AT HIP JOINT.

DR. J. M. WARREN.

AMPUTATION AT THE HIP-JOINT

FOR

A LARGE OSTEO-SARCOMATOUS TUMOR OF THE FEMUR.

BY J. MASON WARREN, M.D.

Re-published from The Boston Medical and Surgical Journal.

MARCH, 1859.—J. Lougee, 16 years of age, of very light complexion, and reddish hair, was born in Lowden, Me., of healthy parents, and, so far as he knows, with no scrofula in the family. His employment for the past year has been that of shoemaking. About seven months since, at the upper and front part of the thigh a deep-seated tumor began to make its appearance, immovable, and slightly painful. It increased slowly in every direction, until he was brought to the Hospital in the last week of March, by his brother, who is a medical man. At this period, the left femur, which was the seat of the disease, was slightly flexed on the pelvis, and the upper half of it was occupied by a large, firm tumor, making a very distinct projection in front, but more indefinite behind, where it mounted up, and was lost in the nates. The front part of it was somewhat nodulated, and was in immediate contact with, and partially pressed up, Poupert's ligament. The skin was everywhere movable on the surface of the tumor, except on the outer side, where a slight redness existed, caused by the application of a blister. There was a moderate degree of mobility of the joint, sufficient to show that the articulation had not been invaded by the disease. The patient could use the limb a little, and was able to walk out with support, though very lame. The glands in the groin were healthy, as well as those of the abdomen, so far as could be distinguished; in short, the glandular

system generally was intact. The appetite was poor. He had no fever. The pain in the tumor required the use of an opiate at night. The circumference of the limb over the tumor was twenty-two inches; the measurement of the corresponding part of the opposite thigh, fifteen inches.

Having made an examination of his case, I at once told the brother of the patient, who from his profession was able to appreciate its importance, that all applications were useless, and the only remedy left was amputation at the hip-joint. The case being a very important one, on the following day I called a consultation of the Surgeons of the Hospital, which resulted in the following conclusions. That the disease was probably an osteo-sarcomatous affection of the femur, which, if left to itself, would very shortly terminate the patient's life in a most painful manner, and the only thing to be thought of was the removal of the femur at its articulation with the hip-bone. On the other hand, from the size and situation of the tumor, the operation was an exceedingly hazardous one, more so than in the ordinary cases of its performance; that there was a possibility of his dying during the operation, or within the subsequent ten days; and even if he recovered from the immediate shock, that there might be a re-appearance of the disease; that these conditions being properly placed before the patient and his friends, if they concluded to take the risk, the operation ought to be done. This question having been fully weighed by the patient and his brother, they decided to have the limb removed, rather than run the risk of submitting to the lingering course of the disease.

The operation was performed in the following manner, on Monday, March 28th, the fifth day after his entrance into the Hospital. The ordinary method by transfixion being impracticable, and in view of the possibility of a dissection of the tumor from its attachments, a large flap of skin was raised from its front part; the incision commencing at the root of the scrotum, and terminating just above, and in front of the great trochanter. The flap was now dissected up quite to Poupart's ligament, the fascia over the artery opened, the vessel exposed, a ligature passed around it and tied. An incision was now made on the back part of the thigh, corresponding with that in front, and the flap partially raised. With a short, strong knife the muscles running from the pubis to the inside of the tumor were cut through, and those on the out-

side treated in a similar manner. These incisions loosened the thigh, which had before been confined, and allowed it to be depressed and rotated outward. It was necessary to do this to a great extent, on account of a lobe of the tumor projecting over and obscuring the articulation. The knife was next applied to the capsule, which was divided, the round ligament snapping off at the same time from the powerful force applied to it. The bone was then disarticulated, the great muscles of the thigh cut through behind, and the limb removed. A very large sponge was thrust into the wound, to prevent bleeding, while the smaller vessels in the flap and trunk were secured. By the skilful compression of the aorta by Dr. Gay, the immediate seizure and compression of the flaps by Dr. Cabot, together with the previous ligature of the femoral, scarcely any blood was lost. The vessels in the flaps were successively tied as they were uncovered by the removal of the sponge; it was also found necessary to secure the great femoral vein.

The lips of the wound were brought together by a number of sutures, a compress was applied, and a very large sponge, to make gentle compression, and fill up the deep cavity in the side of the pelvis; over this a towel, and the whole firmly secured by a bandage. The operation was necessarily protracted much beyond the usual time of an ordinary disarticulation, yet after its termination, and just before the removal of the patient from the table, his pulse was as good as before the operation was commenced.

A section made through the tumor and the femur, which was sawn longitudinally through its middle, presented the following appearances. The tumor was beautifully variegated, and presented the ordinary aspect of osteo-sarcoma. It had its origin between the periosteum and the bone, and extended from the middle of the femur quite to its neck. The periosteum covering the greater trochanter had been peeled up, and the sac of it filled with that yellow oleaginous fluid which is so frequently seen in tumors connected with the bone. The parietes of the bone were somewhat thickened in the centre, thinned toward either extremity, and the medullary cavity was not entirely obliterated. The substance of the tumor itself was quite firm, having the ordinary appearances of carcinoma interspersed with spiculæ of bone. A microscopic examination of it was made by Dr. Ellis, and verified the diagnosis. The head and neck of the bone seemed to have

completely escaped invasion. The muscles covering the tumor were partially adherent to it, but none of them so completely incorporated with it as at first had been feared. The tumor seemed to have been entirely enucleated, and, so far as could be ascertained, not the slightest trace of it was left behind.

In the afternoon of the day of the operation the patient seemed to be in a good condition, and complained only of the tightness of the bandage around his body. This was loosened by cutting it away partially, and completely removed on the following morning. He passed a pretty good night, under the effect of a drachm of the solution of the sulphate of morphia, complaining principally of an excessive thirst, which no amount of drink seemed to satisfy, and which was apparently caused by the operation, but I attributed it partly to the ether. On March 30th, the thirst was somewhat alleviated, but he was still without appetite, and complained of a little soreness in the groin; pressure gave pain in the lower part of the abdomen. The pulse was 100.

The following day he took an enema, which emptied his bowels, and seemed to improve his appetite, so that he chewed a little beef; also took brandy and water, and milk punch, to which he was much averse, never having taken spirit in his life.

On Saturday, April 2d, the wound began to be rather offensive, and at the suggestion of the venerable and distinguished Professor Mussey, who was present, the dressings were removed, and a yeast poultice applied; the pulse was rather over 100; the appetite was still doubtful. On Monday, the 4th, his pulse was 120, there was profuse sweating while sleeping; he began to take his food more regularly, and his pulse to have considerable firmness. He was allowed bread, tea and baked apple for breakfast; bread, meat, and baked apple, of which he was very fond, vegetables, with brandy and water, for dinner; for supper, the same as at breakfast; and at bedtime, to drink through the night, from half a pint to a pint of milk punch. On the 8th of April he is reported as doing well, "he makes no complaint, the pulse is about 100, and he may be said to be in a convalescent condition; the bowels are emptied every other day by enemata, and he has taken no purgative medicine since the day of the operation."

The patient went on improving till the third week after the operation. The wound healed well, leaving an aperture at either end for the escape of ligatures. About the twenty-fourth day, on

waking in the morning, he felt a pressure at the inner part of the stump, and shortly after a stream of blood slowly trickled down. Dr. Dyer, the resident surgical pupil of the Hospital, was immediately summoned, and by means of a sponge applied over the apertures from which the ligatures issued, and a strong compressing bandage, succeeded in arresting the bleeding. The bleeding recurred again in about two hours, and was arrested in the same way. When I saw the patient, about 9, A.M., he was rather pale, his pulse rapid, and his system had evidently received a severe shock. He was not much alarmed, but on this and the following day made great complaint of excessive thirst, as he did after the operation, showing that it was the loss of blood, and not the ether, which caused this symptom. From the free escape of blood at the time, and its arterial color, it was thought probable to have escaped from the great vessel, in consequence of the ligature having partially detached itself; and for this reason it was deemed prudent not to interfere with the wound for the next two or three days. No new bleeding having occurred, I then had all the dressings removed. The two ligatures at the outer part of the stump were seized by the fingers, and withdrawn with very slight force. The four ligatures at the internal part of the stump were then separated, and dragged upon singly, and all of them were removed without difficulty. The two large ones, which had belonged to the artery and vein, had probably been for some time detached, and lay coiled up in the wound, causing irritation and suppuration, and probably the hæmorrhage which had given the alarm.

From that time the wound rapidly healed. The patient left his bed in about a week, and in ten days was able to go out of doors. He has now, May 10th, returned home in the full enjoyment of health.

REMARKS.—This case is worthy of notice from having been the first of amputation at the hip-joint that has succeeded in Boston. The following statistics, from Mr. Erichsen, in his valuable work on Surgery, may be interesting, as showing its mortality, and are partly taken from data furnished by Dr. Smith, of New York: Of 126 cases, 76 died; of 47 cases in which it was done for injuries, 35 died; of 10 cases operated on in the Crimea, all died.

The flaps in this case being principally composed of skin, made the wound much less appalling, and more manageable than where

large muscular flaps are left, as in the ordinary operation. This may be considered worthy of imitation, even when not required by necessity, as in the present case. The previous tying of the artery, together with the compression of the aorta, allowed the operation to be performed in a perfectly comfortable manner, without the slightest hurry, and with almost a dry wound, if the expression may be used.

It may not be inappropriate to append to the history of this case, an operation of similar character performed at the Hospital last year, and printed in this JOURNAL among the Records of the Boston Society for Medical Improvement.

“Amputation at the Hip-Joint.—Dr. Warren mentioned the case as an interesting one, from the fact of its being the first ever done at the Hospital, and, so far as he knew, in Boston. The patient was a child, 6 years old, and was first seen by him on the 19th of June, at three o'clock, having been injured about two hours before. He was sitting on the curb stone of the sidewalk, when a truck wheeled round against him, crushing his limb against the stones. His injury at first was not detected; being lifted up by some passer-by, and placed upon his feet, not being able to support himself, he fell, and received, in addition to his other injuries, a violent blow upon the forehead. When brought to the Hospital his state was as follows. He was quite faint, countenance livid, pulse small. The integuments of the thigh, near the hip, were nearly cut through by a semicircular wound, and on the outside a deep wound in the muscles communicated with the bone, which was fractured obliquely, and denuded nearly up to the joint. As the blood was flowing from this extensive wound, the case admitted of no delay, and amputation was at once proceeded to. The boy was first stimulated with as much spirit as he would bear, and ether was administered, which quickly brought up the circulation. The limb was now separated at the fractured part, Dr. Shaw compressing the artery. Dissection was next made at the side of the bone, which was disarticulated with difficulty, both from the anatomical relation of the parts, these being obscured by ragged muscles, and, more especially, from the remaining portion of the femur being too short to be easily controlled in effecting the disarticulation. The capsule was, however, opened, and the bone dissected out with but little delay. The boy at this moment became deadly faint, and was only restored by using frictions of brandy and ammonia, the latter being applied also to the nostrils. He was likewise suspended by the remaining leg, so as to throw the blood to the brain, and under this treatment soon revived,

although at one moment he seemed to be dead. The vessels were now tied, and the wound temporarily dressed. Just as this was finished, he a second time came in peril of his life. As is often the case with patients recovering from ether, he seemed disposed to vomit, and in fact a basin was held, and he threw up a large quantity of liquid substance. Immediately after this, he fell back as if exhausted, a cold sweat came over him, and the respiration and pulse ceased. The frictions, and other means for restoring suspended animation, were at once again resorted to, and Dr. W. proceeded to pass the finger into the mouth for the purpose of raising the epiglottis and making a passage for the air into the windpipe, when it encountered a mass of solid potato-like substance, with which, on further investigation, the whole mouth and fauces were found completely blocked, so as entirely to exclude the air, and almost suffocate the patient. The teeth had allowed the liquid contents of the stomach to pass between them, but had acted as a strainer to retain the solid matters in the mouth. The mouth being now cleared, and artificial respiration set up, the child gradually commenced to breathe, and in the course of half an hour was in a safe state. At nine, P.M., the limb was dressed, and he was taken to his bed in the ward of the Hospital. The patient lived thirteen days, and received during this time the most unremitting care from the nurse in charge of him, and from Mr. Dyer, the House-surgeon of the Hospital. The stump during this time became quite sloughy, and one or two abscesses formed in the groin. The whole wound, however, finally assumed a healthy appearance, and when there seemed to be every prospect of his having gone safely through the most dangerous part of the trial, he suddenly fell off, and died, nearly a fortnight after the reception of the injury."

ON NEURALGIC AFFECTIONS FOLLOW-
ING INJURIES OF NERVES.

By J. MASON WARREN, M.D.

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INJURIES of the nerves belong more especially to military surgery, and have therefore, until very lately, been but little studied among us. The information given in the common hand-books is also quite meagre, and eminent authorities differ widely upon important points both of prognosis and treatment. I have thought it worth the while, therefore, to collect the opinions of a few leading surgeons upon this subject, and to compare their teachings with the results of my own experience in a few cases which have recently been under my care.

The immediate effects of the division or injury of a large nerve, are the loss of sensation and of motion, and a diminished power of resisting changes of temperature which would ordinarily cause no inconvenience. Severe pain is also a very common symptom, but is not always observed until after the lapse of a certain time after the receipt of the injury. The loss of sensation and of motion may be either temporary or permanent, as might naturally be expected, but the connection between the precise nature of the injury and the subsequent phenomena has not often been marked out with so much exactness as could be desired. I shall confine myself chiefly to the question of the treatment of neuralgia following injuries of the nerves, commencing by a few quotations from good authorities.

"The best means of mitigating the pain," says Mr. Guthrie (*Commentaries on Surgery*), "independently of the application of warmth, is by the application of stimulants to the whole of the extremity affected, followed by narcotics." The particular applications suggested are tincture of iodine or of cantharides, oil of turpentine, croton oil, liquor ammoniæ, veratria, &c., using them "of such strength as to cause some irritation on the skin, short, however, of producing any serious eruptions." He would follow these stimulant remedies by opium, belladonna, or hyoscyamus applied in the form of an ointment; or by the tinctures of the same narcotics or of aconite applied on linen; he also suggests the employment of aconitia made into an ointment with lard in the proportion of one grain to a drachm.

Dr. Hennen (*Principles of Military Surgery*, Chapter XI., on Injuries of Nerves) states that "mechanical injuries of the nerves are entirely beyond the power of art to relieve effectually, but (that) they are objects

of great curiosity, and illustrative of many important symptoms that occur in the course of practice." He mentions a secondary paralysis which "very frequently takes place without any immediate injury of the nerve, as in those cases when a ball has passed so close to a large one, or the plexus from which it proceeds, as to occasion an inflammation and consequent thickening of the neurilemma or investing membrane; or when, in the more distant transit of the ball, the tube formed by its passage swells to an extent sufficient to press on the nerve or plexus." In a celebrated case reported by Dr. Denmark (*Medico-Chirurgical Transactions*, vol. iv.), in which the patient was tormented by a severe neuralgia, corresponding to the parts supplied by the radial nerve below the elbow, amputation was performed with complete relief of the pain, and on dissection the cause of the trouble was discovered in a bit of lead imbedded in the radial nerve. In a comment on this case Dr. Hennen approves the course adopted, "although the nature of the lesion was suspected previous to amputation, and indeed almost demonstrated by the symptoms and site of the wound." His objections to any attempt to dissect out the nerve and remove the foreign body, are "the extent to which the thickened and diseased state of the investing membrane of the nerves may reach; the certainty of greatly lessening, and perhaps eventually destroying the motion and sensibility of the parts to which they are distributed, by cutting off the communication with the sensorium; the contracted or distorted state in which the limb generally is; and the possibility of exciting universal and highly dangerous commotion of the system." He further states that while "the total division of a partially wounded nerve is the only operation recognized by modern surgery, the experiment is both hazardous and uncertain; he therefore confines himself to venesection, with emollients to the parts."

An interesting case of traumatic neuralgia, lasting several months, finally recovering without an operation, reported by Mr. Longmore in Mr. Holmes' *System of Surgery*, closely resembles several of my own cases reported in this paper, and will be cited in connection with them to complete the history of this interesting affection.

In the chapter in *Holmes' Surgery* on the Diseases of Nerves, Dr. Brown-Séquard has given an able *résumé* of various reflex affections following injuries of the nervous trunks and large branches. For the treatment of all these affections, whether taking the form of epilepsy, tetanus, neuralgia, paralysis, &c., he dwells chiefly upon local measures, and among these he gives the preference to the artificial section of the injured or irritated nerve between the brain or spinal cord and the part of the nerve which is altered. "When there is any chance of a persistence of the irritating cause after the time necessary for the reunion of the parts of the divided nerve," he states that "an excision of an inch or two, which will retard reunion, must be made instead of a simple division." He states also that owing to changes which may take place in the nutrition of the nerve above the part

originally affected, it may sometimes be proper to divide the nerve at a point considerably higher than would otherwise be necessary, in some cases operating "even as near the nervous centre as safely possible." Besides these cases requiring division of the nerve, there are others in which "all that is necessary is to gain a few days to allow a wound to heal up." In such a case he recommends "to lay bare the nerve above the wound, and to drop sulphuric ether upon it, which operation, especially if repeated, will render the nerve for many days quite unable to transmit any irritation from the original wound." "Amputation of a limb (he says) should never be resorted to with the view of curing reflex epilepsy, tetanus, &c., unless of course this operation happens to be necessary for another purpose." As the next best local means after neurotomy for combating these affections, he advises the employment of "subcutaneous injections of narcotics, just above the wound, or on the irritated nerve, together with applications of emollient and narcotic lotions or poultices on the wound itself." The dose recommended for subcutaneous injection is half a grain ($\frac{1}{2}$) of morphia or one sixtieth ($\frac{1}{60}$) of a grain of atropia; he also makes the important observation "that in many cases of reflex (nervous) affections, the most powerful narcotics, especially opium, are borne in large doses, without any poisonous effect."

The proposal of the plan of treating nervous affections of this kind by neurotomy involves the whole question of the repair of injured and divided nerves, a subject not very fully discussed in works on surgery, and therefore not very familiar to practical surgeons. I have thought it proper therefore to collect such facts as I could upon the subject both of simple division of nerves and also of division with the excision of a longer or shorter portion of the trunk.

As regards the question of reunion of the two ends of a divided nerve, there is no doubt that such a result often occurs. A sufficient proof of this fact is seen in the restoration of nervous action in the trifacial nerve even after the removal of a portion of one of its larger branches for facial neuralgia,¹ also in the occasional reproduction of the nerves in the foot of

¹ In two cases where I have removed a portion of the inferior maxillary nerve, amounting to about half an inch, for the relief of *tic douloureux*, regeneration of the nerve with full restoration of its functions afterwards took place. In the first case, operated on by Dr. J. C. Warren, the disease was relieved for six months, when the pain returned in the same spot beyond the excised portions of nerve. A year after the first operation I trephined the bone and excised a second portion of the nerve with permanent relief. In the second case, which is published in the *Transactions of the Boston Society for Medical Improvement*, June, 1858, the lower jaw was trephined near the angle, and half an inch of the nerve removed for a *tic douloureux* of eight years' duration, confining the patient for most of that time to her couch. This patient was entirely relieved for about a year, at the end of which time sensibility had become almost wholly restored to the parts beyond. The violent and persistent neuralgia has not returned, although occasional paroxysms are felt at the same spot as before.

the horse when divided or partially excised to conceal or relieve certain forms of lameness. The same fact is also proved physiologically by the experiments of Cruikshank and Haighton upon the vagus of dogs, and anatomically by Meyer, Swan, Tiedemann and others, who have actually traced the new nervous filaments in the cicatricial tissue, uniting the cut ends and filling the void caused by the excision of a portion of several lines (and in one case nearly an inch) in length. Clinical observations bearing upon the same point are recorded by various authors. Mr. Syme, in his *Treatise on the Excision of Diseased Joints*¹ (Case VIII., page 88), gives a remarkable case in which the ulnar nerve was wholly divided at the elbow in the operation of excision of that joint, and in which the functions of the nerve were perfectly restored in the course of a few weeks. A subsequent dissection of the arm less than a year after the operation, revealed the fact that perfect union of the cut ends of the nerve had taken place, and that the nervous filaments could be traced from both ends into the intermediate new tissue and apparently also from one end to the other. In a similar case reported by M. Roux, a portion of the ulnar nerve was actually cut away, but in the course of a year sensation had entirely returned, and when the patient was examined fourteen years after the operation the sensation was as perfect as in the other arm.

A very interesting case of union of the median nerve, after division at the wrist-joint by a circular saw, occurred in the practice of Mr. Stanley, and is admirably reported by Mr. Paget. (*Lectures on Surgical Pathology*. Lecture XII.). In this case sensation began to return within ten days or a fortnight, and was nearly complete in the course of a month. In another similar case, also quoted by Mr. Paget, in which the injury was inflicted with a chaff-cutting machine, the subsequent history was much the same as in the boy treated by Mr. Stanley. These cases are cited by Mr. Paget in illustration of a mode of repair which he calls primary union in contradistinction from secondary union, which takes place by the formation of new connecting substance, and generally requires twelve months for even a partial restoration of the nervous function.

In view of these facts it is important to inquire into the propriety of dividing the nerve as a remedy for traumatic neuralgia. In answer to this question, we may state that if the nerve is simply divided, sensation will probably return before the tissues implicated in the original injury have had time to recover their normal condition, and that, therefore, the operation will afford only very transient relief and may have to be repeated several times. If, on the other hand, a portion of the nerve is excised, the restoration of the nervous function will be very much longer in taking place, but there will also be great danger that the repair will be incomplete

¹ For the reference to this and the following case I am indebted to Dr. R. M. Hodges, who has also called attention to them in his valuable and interesting paper on Excision of Joints.

or even that it may fail altogether, and thus entail permanent loss both of sensation and of motion. The deliberate removal of a long section of the nerve with a view to the permanent abolition of its functions can be but very rarely indicated, and then only as a "dernier resort," as the possible alternative of amputation.

The rational treatment of these neuralgic affections seems to me to be based on the fact that their natural tendency is to recovery, if only we can keep the patient comfortable and thus induce him to wait for this tardy relief. This can only be effected by division of the nerve or by the use, either local or general, of narcotics. The protracted use of opium internally in sufficient quantity to relieve the pain, will almost inevitably exert a most pernicious influence on the health, while mere local applications to the skin seem to have very little effect. The great benefit which has been derived from the use of hypodermic injections of morphia for ordinary neuralgia, naturally suggested the propriety of trying them in this affection, and the success which has attended the experiment has been most gratifying.

The following cases of severe traumatic neuralgia, which have lately occurred in my practice, serve to throw light upon certain points in the pathology and treatment of this painful affection. In all these cases the injury seems to have been to the tissues surrounding a nervous trunk rather than to the nerve itself, and the immediate cause of the painful affection which followed would seem to depend upon the effusion of inflammatory products within the dense fibrous neurilemma, thus entangling the nerve in a mass of cicatricial tissue, perhaps also compressing its fibres. The highly favourable result in Case I. may be readily explained by the well-known law of development of new reparative material, by which it becomes gradually assimilated to the proper tissue of the part in which it is deposited. The dissection made in the course of the operation showed that the nerve was then firmly glued to the surrounding tissues, and its release from these connections was followed by perfect relief of the pain, which, however, returned in a diminished degree as soon as the process of cicatrization had again commenced. The pain was then controlled during six months by the daily use of hypodermic injections of morphia, and at the end of this somewhat protracted treatment the neuralgic affection was found to have disappeared and the nerve had so far recovered its normal condition as to conduct ordinary sensations in a very satisfactory manner. The second and third cases are equally interesting as showing the powerful effect of the narcotic injection, in the one case in relieving the pain, and in the other actually curing it. The case of Mr. Longmore is also added to show the important part which time plays in the cure of all such cases.

CASE I. *Severe Neuralgic Affection following a Gunshot Injury of the Median Nerve.*—In the second battle of Bull Run, Lieut. A., of a N. H. regiment, was struck by a ball on the outside of the middle of the arm. The ball passed obliquely through, traversing the biceps muscle and coming

out on the inside. For two or three days he was exposed to the weather, lying under the piazza of a house, having but little food, and with his hand constantly wet with the rain which was falling. The hand was benumbed, but he suffered somewhat with a sensation of heat in it, which was partially relieved by keeping it exposed to the wet. There was no pain in the wound itself. Shortly after he was removed to Washington, where he first experienced very severe pain in the whole hand, but more particularly in the part of it supplied by the median nerve. I saw him about a fortnight after the receipt of the injury. He was then in constant and severe pain in the hand, so much so as to require to be kept more or less under the influence of morphia, which he was taking to the amount of a grain a day. On examining the point at which the wound was received, a puckered eschar was seen with an induration extending deeply into the belly of the biceps muscle to which the skin was adherent. The situation occupied by the vessels and nerves on the inside of the biceps was also enveloped in a mass of indurated tissue. The first idea suggested by this state of things was to cut down upon the nerve, to divide it. It seemed, however, possible, by the gradual change going on in the tissues, that a healthy action might ultimately be set up, and at the same time, the indurated tissue surrounding and compressing the nerve might be absorbed, finally relieving the nerve from pressure. The question was whether the sufferings of the patient could be sufficiently mitigated by artificial means to allow of the adoption of a temporizing course. He was advised to place the limb perfectly at rest, wear it inside his clothes, next the body, and to have a sleeve made of sheet India rubber to envelop the lower part of the arm, which covering was to be removed from time to time, the arm exposed to the air and washed with soap and water; he was directed to discontinue the use of the rubber sleeve if much irritation was set up in the skin, and to envelop the arm in flannel instead, which he had at all times found necessary owing to the great reduction of temperature. He went home to New Hampshire, and followed this plan for three or four weeks. At the end of that period he came to me again with the desire of having the nerve divided, as his sufferings had become so intolerable, in spite of the use of opiates, as entirely to deprive him of rest. Before resorting to an operation on the nerve I determined to try the effect of subcutaneous injections of morphia. Half a grain of sulphate of morphia, in solution, was injected deep under the skin of the forearm twice a day. He was at once placed in a state of comparative ease, and the evening injection gave him a good night's rest, such as he had not enjoyed for many weeks. This plan was followed up for a month with equally good effects; his digestion was not in the least affected by the use of the morphia, and he gained considerably in flesh. If, however, the dose was omitted, the pain became as bad as ever. It was therefore decided to perform an operation. An incision of three inches in length was made over the inner edge of the biceps, and the integument dissected on both sides separating the cicatrices, caused by the entrance and exit of the ball from the subjacent tissues. The indurated mass which surrounded the vessels and nerves was now cut into, and the median nerve being discovered where it entered was gradually laid bare and dissected out so that it lay perfectly loose in the wound for an inch and a half or two inches of its length. It was thought best not to divide the nerve, but to await the result of the healing of the wound. The edges of the wound were loosely approximated, and water dressings applied. For some days the pain was entirely relieved, although from the effect of the habitual use of morphia,

a small dose was required to promote sleep. As the wound began to heal, however, the pain returned, but was much less severe than before. Desiring now to return home, one of his family was instructed in the use of the subcutaneous injection of morphia. About two months afterwards he called on me, and again (March 20, 1863) four months after the operation. He was then in a state of perfect health, and had gained much flesh, but complained still of neuralgic pain in the hand, requiring the employment of the narcotic injection, whether from habit or not seemed to be a question. The arm, hand, and fingers had begun to acquire some motion. In regard to the local effect of the injections it may be said, that although they had been used twice a day for five months, he had never suffered from any irritation at the point of puncture except in one instance in the case of a freshly prepared solution of sulphate of morphia, the use of which was followed by the production of a large red blotch whenever it was injected. On substituting a solution of acetate of morphia no farther trouble of this nature was experienced.¹ The patient had, therefore, had nearly three hundred injections of morphia, more or less, and with the above exception no traces remained of its protracted use.

Oct. 26, 1863. I have just seen this patient, and find that he has recovered his health and enjoys complete immunity from pain. The hypodermic injections were continued until the month of July, or about nine months from the receipt of the injury. He then by a great effort suddenly discontinued them, and has not used them since. The neuralgic affection, except during extreme changes of the weather, has left him. The forearm has recovered its natural sensibility; he has the power of complete flexion of the elbow, and of partial rotation of the forearm, while the fingers, which were formerly held in a state of extension, can now be approximated to the thumb, so as to make the hand useful for most of the ordinary purposes of life. This motion is continually improving.

CASE II. *Gunshot Wound of the Thigh implicating the Sciatic Nerve.*—I have lately had under my care, in the hospital, a soldier, who, two months before, was shot in the thigh, and was taken prisoner. The ball traversed the thigh from side to side, and, probably, injured the sciatic nerve, in whose immediate neighbourhood it must have passed. He suffered no inconvenience in the site of the wound, but shortly afterwards a severe neuralgic pain commenced in the sole of the foot, accompanied by a sensation of heat and great tenderness of the part, and entirely incapacitating him for locomotion. Opiates in the usual form gave him but little relief, and the only alleviation of his sufferings while in prison at Richmond was obtained by keeping the leg constantly plunged in a pail of cold water. I immediately ordered the subcutaneous injection of a quarter of a grain of morphia daily into the leg, and gradually increased the dose to a grain a day. By this treatment the pain was completely held in check, rendering his days and nights comfortable. The full effect of each dose was obtained in from five to ten minutes after injecting it.

In the course of this case I experimented as to the effect of the injection, when made at a distant part of the body, as compared with its effect when applied in the immediate vicinity of the affected nerve. I found that when

¹ This accident is probably to be explained by the common practice of adding free sulphuric acid to promote the solubility of certain specimens of sulphate of morphia. The acetate is very soluble in water.

the injection was made in the opposite limb to that affected, the relief was as prompt and as complete as when made directly over the course of the nerve; and this occurred repeatedly, in every instance in which it was tried. This is a point of very considerable importance, inasmuch as it is often very inconvenient to make the injection in the exact situation of the affected nerve, as has been strongly insisted on by several writers upon this subject.

CASE III. *Injury of the Ulnar and Musculo-Spiral Nerves, from a Bullet.*—Capt. C——, who had already been twice wounded in the thigh and leg in the battles of Winchester and Fredericksburg, was hit at the battle of Gettysburg by a ball just over the median nerve. It passed in a spiral direction around the bone, and came out half way down the limb below on the other side. The hand and forearm were at once partially paralyzed, and in a day or two very severe neuralgic pains commenced, principally in that part of the hand supplied by the ulnar nerve. When I first saw him, about a week after the injury, the arm was much swollen, and the wounds, which had still on them the cold water dressing, were in an irritable state, and there was no appearance of suppuration. The water dressings were replaced by a large warm poultice, and on a free suppuration being established the extreme pain in the arm and hand was much relieved. The pain, however, still continued to recur at intervals, and the paroxysms coming on at night were very severe. Finally the hypodermic injection of morphia was tried, and a single dose of $\frac{1}{2}$ grain afforded entire relief for the time being, and in fact destroyed the habit so that the paroxysms did not recur. The hand and arm, however, for a long time afterwards were very uncomfortable on account of the excessive heat of the parts, which was only relieved by the constant use of cold water, and it was not until after several months that the normal sensibility began to return, and this symptom to disappear. Seen again at the end of five months, he was free from neuralgic pain, had some use of his hand, and the elbow has become flexible after employing forcible extension to overcome stiffness produced partly by inaction and partly by the contraction of the injured muscles. The movement of rotation of the forearm had not yet been recovered by the patient, although they could be easily made by a second person, the nervous power being still deficient.

Case recorded by Mr. Longmore (*Holmes' System of Surgery*, vol. ii. p. 88).

"A soldier of the 37th Regt. was wounded at Azimghur on the 27th of March, 1858, by a musket ball through the right side of the neck. It entered just below the horizontal ramus of the jaw, and made its exit behind, over the scapula. About three pints of blood escaped, supposed to be from the external jugular vein. The wound healed favourably, but he lost the use of his right arm, at first completely, and afterwards partially, for three months. At the expiration of that period the power of the arm was restored, but he was invalided home on account of severe pain in the back of the neck, 'resembling toothache,' which all treatment failed to relieve. The pain spontaneously and gradually ceased; there is still some loss of substance of the trapezius muscle of the right side of the neck, and of the right as compared with the other arm, with occasional numbness, when the man is in heavy marching order; but in all other respects he is well, and is at his regular duty."

Boston, January 15, 1864.

